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U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, Secretary

OFFICE OF TECHNICAL SERVICES
Donald A. Schon, *Director*

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Use of funds for printing this publication approved by the Director of the Bureau of the Budget, June 30, 1961.

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AD 427 000 - AD 414 099

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TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-427 014 Div. 1, 9, 12, 14, 18, 23, 25, 22
OTS price $2.75

Defense Documentation Center, Alexandria, Va.
PARACHUTE TECHNOLOGY. A DDC REPORT BIBLIOGRAPHY.
Bibliography for 1953-1963,
comp. by Samuel A. Tancredi. Jan 64, 1v.
617 refs.
Unclassified report

Descriptors: (*Parachutes, Bibliographies), (*Bibliographies, Parachutes), Parachute fabrics, Parachute descents, Parachute flares, Parachute jumping, Packs, Bail out, Cargo parachutes, Drag parachutes, Ribbon parachutes, Rotorchutes, Spin recovery parachutes, Ejection, Air Force equipment, Air drop operations, Air Force operations, Aviation personnel, Training, Test facilities, Containers.

This bibliography was prepared by the Defense Documentation Center (DDC) for use at a symposium on Parachute Technology. Citations included for documents cataloged by DDC from 1953 through 1963 are restricted to unclassified unlimited references. Entries are arranged in alphabetical sequence by subject areas pertaining to aerial, canopies, materials, parachutes (types), recovery systems, physical effects, and testing. These subject areas are subdivided further into more specific topics.

AD-427 337 Div. 1
OTS price $1.60

Shell Development Co., Emeryville, Calif.
STUDY OF HELICOPTER GEAR LUBRICATION.
Quarterly progress rept. no. 2, Sep-Nov 63,
by S. J. Beaubien and L. Lichtman. Nov 63, 8p.
Rept. no. S13905
Contract NOw63 0557c
Unclassified report

Descriptors: (*Helicopters, Transmission gears), (*Transmission gears, Lubrication), Gears, Lubricants, Failure (Mechanics), Fracture (Mechanics), Loading (Mechanics).

A study is made of helicopter gear lubrication. A study of the types of failure that have occurred in helicopter transmissions in the field is made and an attempt to learn the causes of such failures on a theoretical and experimental basis. The over-all objectives of the work, however, are not limited to solutions of gear lubrication problems of existing helicopter transmissions, but also aim at developing information useful to future transmission designs and, in part, applicable to other gear systems. (Author)

AD-427 770 Div. 1, 8
OTS price $8.10

Bendix Corp., York, Pa.
PORTABLE AIRCRAFT CONDITION EVALUATOR RECORDER
Final rept.
Dec 63, 74p.
Contracts DA44 177TC750, DA44 177TC641;
Proj. 9R38 01 017, Tasks 1D141812D18416, 9R89 02 015 16
ATRECOM TR63 48 Unclassified report

Report on project PACER.

Descriptors: (*Army aircraft, Checkout equipment), (*Checkout equipment, Aircraft), Maintenance, Vibration, Temperature, Pressure, Portable (Man-portable), Automatic, Recording systems, Airborne, Ground support equipment, Punched tape, Monitors, Electronic recording systems.

Study and design is reported on an automatic electronic checkout system to evaluate and record aircraft component condition for Army aircraft. The system will provide a printed and punched tape record. Selected test areas of the aircraft are monitored during static and dynamic conditions. The system sensors are integral with the aircraft while the evaluation and recording portion is ground support equipment. This system is compatible with the Automatic Light Aircraft Readiness Monitor (ALARM) system. (Author)

AD-427 835 Div. 1
OTS price $1.10

Beech Aircraft Corp., Wichita, Kans.
PROTOTYPE DEVELOPMENT MODEL 385 AIR REFUELING STORE.
Interim rept. no. 42, 1-30 Nov 63,
by C. V. Lassmann. 9 Dec 63, 4p. Rept. no. ER4908
Contract NOw60 0060c
Unclassified report

Descriptors: (*Refueling in flight, Research program administration), Costs, Design, Structural parts, Aeronautical booms, Manufacturing methods.

Efforts have been concentrated on manufacture of additional prototype articles. Basic design has been completed; detail manufacturing drawings are in process. It is anticipated that procurement and tooling for long lead items will be started in the immediate future. The configuration for these stores has been developed from the value analysis task and will incorporate improvements as indicated by recent tests on the prototype stores. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-427 031 Div. 2
OTS price $6.60

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
SOLAR FLARE RADIATION SURVEY,
by L. R. Lewis, G. M. Brown, J. Gabler and R. M. Magee. Dec 63, 1v.
Contract AF29 601 5224, Proj. 8803
RTD TDR63 3044 Unclassified report

FEDERAL REGIONAL TECHNICAL REPORT CENTERS

Each of the Federal Regional Technical Report Centers listed below contains a collection of USAEC, NASA, and DOD unclassified reports as well as reports of other U. S. government agencies and provides reference, interlibrary loan, and reproduction services.

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General Library
Berkeley, Calif. 94704

University of California
University Library
Los Angeles, Calif. 90024

Library of Congress
Science and Technology Division
Washington, D. C. 20540

Georgia Institute of Technology
Price Gilbert Library
Atlanta, Ga. 30300

The John Crerar Library
35 West 33rd St.
Chicago, Ill. 60616

Massachusetts Institute of Technology
M. I. T. Libraries
Cambridge, Mass. 02139

Linda Hall Library
5109 Cherry Street
Kansas City, Mo. 64100

Columbia University
Engineering Library
Seeley W. Mudd Building
New York, N. Y. 10027

Carnegie Library of Pittsburgh
4400 Forbes St.
Pittsburgh, Pa. 15213

Southern Methodist University
Science Library
P. O. Box 1339
Dallas, Tex. 75222

University of Colorado
Boulder, Colo. 80301

University of Washington Library
Government Documents Center
Seattle, Wash. 98105

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Buffalo, N. Y. 14200

University of Cincinnati
Cincinnati, Ohio 45200

Detroit Public Library
Detroit, Michigan 48200

University of Utah
Salt Lake City, Utah 84100

The following Cumulative Indexes for U. S. Government Research Reports are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., 20402:

Volume 32	July - December 1959	$1.00
Volume 33	January - June 1960	$1.00
Volume 34	July - December 1960	$1.00
Volume 35	January - June 1961	$1.00
Volume 36	July - December 1961	$3.50
Volume 37	Semi-annual Cumulative Index January - June 1962 Includes both Technical Abstract Bulletin (TAB) and "Non-Military and Older Military Reports" sections.	$3.50
Volume 37	Semi-annual Cumulative Index July - December 1962 Includes Technical Abstract Bulletin only.	$3.50
Volume 37	Annual Cumulative Index January - December 1962 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
Volume 38	Collective Index 1 January - 1 May 1963 Includes Technical Abstract Bulletin only.	$3.50

For information regarding the availability of earlier indexes write to Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

stations to record magnitude 4 to 5.5 earthquakes. Suggested designs of unmanned and other special-purpose seismic stations are included. (Author)

AD-427 207 Div. 2, 30
OTS price $13.00

Acoustics and Seismics Lab., U. of Michigan, Ann Arbor.
TABLES OF AMPLITUDE AND ENERGY RATIOS FOR PLANE SV WAVES.
VESIAC special rept.,
by John K. Costain, Kenneth L. Cook and S. T. Algermissen. Dec 63, 176p. Rept. no. 4410 68X
Contracts SD78, AF19 628 201
Unclassified report

Descriptors: (*Energy, Tables), (*Amplitude modulation, Wave transmission), (*Seismic waves, Measurement), Simultaneous equations, Linear programming, Programming (Computers), Velocity, Density.

This report presents tabulations of energy ratios calculated from Knott's energy equation, and amplitude ratios calculated from the Zeoppritz equations, for a plane SV wave incident on a plane elastic discontinuity. All computations were programmed in FORTRAN for an IBM 1620 digital computer. Incident angles were varied from 0 degrees to 90 degrees in increments of 2 degrees except near the critical angles, where the ratios were calculated in increments of 0.25 degrees generally. Both real and imaginary coefficients were considered in the calculations. The varying parameters were the velocity ratio and density ratio across each interface, and the angle of incidence. Energy ratios were computed for a Poisson's ratio of 0.25 only, and amplitude ratios were computed for Poisson's ratios of both 0.25 and 0.40. Compressional velocity ratios (transmitted/incident) of 0.7, 0.8, and 0.9, and density ratios (transmitted/incident) of 0.7, 0.8, 0.9, and 1.0 were used. The data are presented in 36 tables, 12 for energy and 24 for amplitude ratios. (Author)

AD-427 328 Div. 2, 30
OTS price $1.60

Illinois U., Engineering Experiment Station, Urbana.
A FORTRAN SUBROUTINE TO DETERMINE THE COMPONENTS OF THE EARTH'S MAGNETIC FIELD AS A FUNCTION OF ALTITUDE AND GEOGRAPHIC COORDINATES FROM A SPHERICAL HARMONIC EXPANSION,
by Roger A. Vossler. Nov 63, 13p. TN24, RRL P220
Contract Nonr1834 02; Proj. 371 161
Unclassified report

Descriptors: (*Terrestrial magnetism, Programming (Computers)), Programming languages, Magnetic field, Harmonic analysis, Mathematical analysis.

Contents: Mathematical description of problem; Tables of gaussian coefficients; Program input/ output; Flowchart; Program listing.

AD-427 359 Div. 2, 25
OTS price $4.60

Boeing Scientific Research Labs., Seattle, Wash.
ATMOSPHERIC NEUTRON FLUX MEASUREMENTS,
by Joleroy Gauger. Oct 63, 41p.
Rept. no. D1 82 0257
Unclassified report

Also available from the author.

Descriptors: (*Neutron flux, Atmosphere), Terrestrial magnetism, Neutron spectrum, Measurement, Energy, Experimental data, Protons, Van Allen radiation belt, Pulse height analyzers, Solar disturbances, Ionization chambers.

A measurement of the energetic neutron flux at atmospheric depths from 160 gm cm-2 to 300 gm cm-2 has been carried out over latitudes extending from the equator to 55 degrees N geomagnetic. Comparison of data with previous measurements indicate that at the time of these measurements the neutron spectrum is steeper than that determined by Hess et al (1959) for neutrons of E greater than 60 Mev but is of the same form for E less than 10 Mev. An anomalous increase in the flux of neutrons of E greater than 60 Mev was detected on 21 July 1962 over a region from 50 degrees to 55 degrees N geomagnetic. The increase is possibly attributable to a dumping of protons temporarily trapped in the slot between the inner and outer Van Allen zones. (Author)

AD-427 381 Div. 2
OTS price $1.60

Harvard Coll. Observatory, Cambridge, Mass.
THE SUN'S MAGNETIC FIELD AND THE STABILITY OF SOLAR MARKINGS,
by Donald H. Menzel and G. E. Moreton. Nov 63, 17p. Scientific rept. no. 24
Contract AF19 604 4962, Proj. 7649, Task 764901
AFCRL 63 762 Unclassified report

Reprint from Solar Corona, pp. 315-329, 1963. (Copies also available from DDC)

Descriptors: (*Sun, Magnetic fields), Solar atmosphere, Stability, Photographs, Astronomical observatories, Band spectrum, Detection, Solar flares, Solar disturbances, Stereoscopic photography.

This paper relates to the interpretation of photographs taken at the Lockheed Solar Observatory with an H-alpha filter having a pass band of 0.5 Angstroms. Photographs taken at the line center refer to higher atmospheric levels than do those taken in the wings. The program of solar photography at Lockheed has featured the taking of records in rapid sequence at 10 sec intervals. Records taken approximately 0.5 Angstroms to the red or violet of the line center are relatively free from the complex bright and dark plages characteristic of chromospheric and prominence activity. (Author)

AD-427 392 Div. 2, 6
OTS price $1.60

Sylvania Electric Products, Inc., Waltham, Mass.
CORRELATION DETECTION OF SEISMIC DISTURBANCES,
by Paul W. Cooper. 27 June 63, 16p. Research rept. no. 374
Unclassified report

Descriptors: (*Seismic waves, Direction finding), Correlation techniques, Signal-to-noise ratio, Direction finding signals, Detection, Nuclear eplosions, Noise, Velocity, Correlators.

In a medium in which noise and signal propagate with different velocities, a detection scheme making use of the cross-correlation between the received waveforms at two different locations offers a number of distinct advantages over one making use of ordinary autocorrelation of the received waveform. These advantages arise from the resultant relative shift between the noise and signal autocorrelation functions allowing for

Descriptors: (*Solar flares, Reviews), Classification, Solar radiation, Solar disturbances, Radiation hazards, Astronauts, Protons, Neutron flux, Cosmic rays, Alpha particles, Gamma rays, X-rays.

The empirical characteristics of solar flare emissions are reviewed from the data available in the scientific literature. Flare classification systems, optical and corpuscular, are discussed. Those emissions recognized as potential hazards to astronauts protected by only moderate shields have been given special attention. Solar proton events are described in detail, including frequency of occurrence, correlation with PCAs, propagation models, temporal characteristics (arrival times, rise times, duration, decay), spatial distribution, and energy spectra. The cases in which alpha particles and charged heavy nuclei have been detected are presented, as are the observations of electron and gamma ray fluxes reported in the literature. Solar flare radio emissions are discussed in relation to their possible elucidation of the processes of solar physics involved in flare phenomena and in recognition of possible particle-event prediction schemes based upon their observation. (Author)

AD-427 034 Div. 2
OTS price $9.10

McGill U. (Canada).
ALBERTA HAIL STUDIES, 1962/1963.
Aug 63, 98p. Rept. no. SR MW36; SR1
Contract AF19 628 249, Proj. 8620, Task 862004
AFCRL 63 783 Unclassified report

Descriptors: (*Hail, Atmospheric precipitation), Storms, Meteorological phenomena, Distribution, Rainfall, Wind.

In first two of four separate contributions, Carte, and Williams and Douglas discuss discontinuity of hail fall-out pattern within swath. Carte's statistical evaluation of voluntary reports from farmers in Alberta leads him to suspect the existence of many regions within the swath without hail; Williams called on farmers, found pattern in hail fall-out, but concludes that hail falls everywhere within the swath. Douglas in third contribution shows that size distributions of collected hail samples can be summarized by N = 10 M exp (-2.93 D), where NdD is the number of stones in the diameter range D to D + dD per m3, M is the hail content of the air (g m-3), and D is the hail diameter in cm. Srivastava concludes with a critical review of some twelve papers on the cloud dy- . namics of severe storms, and pinpoints two areas where further work is now promising (and with which in fact he is proceeding): the development of buoyancy of steady jets and the accumulation of precipitation in the updraft. (Author)

AD-427 035 Div. 2, 12
OTS price $19.75

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
SOLAR FLARE SATELLITE DESIGN STUDY.
Final rept.,
by L. R. Lewis, G. M. Brown and B. H. Colmery.
Dec 63, 1v.
Contract AF29 601 5224, Proj. 8803
RTD TDR63 3010 Unclassified report

Descriptors: (*Satellites (Artificial), Hazards), Space environmental conditions, Solar flares, Solar radiation, Solar disturbances, Manned spacecraft, Biophysics, Dose rate, Radiological dosage, Radiation hazards, Manned, Instrumentation, Payload, Detectors.

A study was made of the characteristics required for a satellite to evaluate the solar flare hazard to near-earth manned space missions. The most important parameters to be measured in the space radiation environment were determined, and an instrumentation package was selected from existing instruments or instruments under development. In those instances where instruments were not available, preliminary designs of recommended instruments are presented. A preliminary overall satellite system was designed and a preliminary design iteration was made on all satellite subsystems to determine possible problem areas. (Author)

AD-427 087 Div. 2
OTS price $9.60

Scripps Institution of Oceanography, U. of Calif., La Jolla.
(No title).
Annual progress rept., July 62-June 63.
15 Nov 63, 106p. Ref. no. 63 30
Contracts Nonr221601, Nonr221612; Proj. NR083 005, NR083 502
Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Oceanology, Ocean waves), (*Marine geology, Sedimentation), Minerals, Oceanographic equipment, Ocean bottom, Depth and roll recorders, Bathythermographs, Geochemistry, Clay minerals, Feldspar, Quartz, Carbonate minerals, Ecology, Protozoa, Foraminifera, Stratigraphy, Micropaleontology, Radiolaria, Sea water, Oceanographic vessels.

AD-427 206 Div. 2
OTS price $7.60

Acoustics and Seismics Lab., U. of Michigan, Ann Arbor.
THE REQUIREMENTS OF A HIGH-SENSITIVITY SEISMOGRAPH STATION,
by Dean S. Carder. Oct 63, 72p. Rept. no. 4410 63X
Contract SD78
Unclassified report

VESIAC state of the art report.

Descriptors: (*Seismological stations, Sensitivity), Effectiveness, Background, Noise, Selection, Design, Seismographs.

The efficiency of a short-period seismograph is regulated largely by the nature and magnitude of the so-called background noise prevalent at the station. This background noise is more or less continuous and varies from place to place and from time to time. Effects of this noise may be reduced by (1) selecting a station site where the noise is low, either remote from noise sources, in the shadow of noise barriers, or deep underground; or by (2) the use of frequency and wavelength filters. Frequency filters are in large part ineffective because the signals we wish to measure have the same frequency (from 0.5 to 5 cps) as the noise; and wavelength filters require the use of expensive arrays. This report discusses possible sources and methods of propagation of background noise and the selection of optimum sites and methods for reducing the effect of noise. Present and suggested future arrays are included in this discussion. Highly sensitive seismograph stations and instruments in current operation are described, and comparisons are made of the ability of some of the better

4. CHEMISTRY

AD-427 027 Div. 4, 14, 17
OTS price $1.50

Cincinnati U., Ohio.
MATERIALS ANALYTICAL RESEARCH,
Rept. for 15 June 60-31 Mar 63,
by Michael Hoch. Nov 63, 45p.
Contract AF33 616 7450, Proj. 7360, Task 736005
ASD TDR63 620 Unclassified report

Descriptors: (*Materials, Scientific research), (*Abstracts, Molecular structure), (*Molecular structure, Abstracts), Molecular weight, Mass spectroscopy, Absorption spectrum, Infrared spectroscopy, Chromatographic analysis, Ultraviolet spectroscopy, Microanalysis, Chemical analysis, Spectroscopy, X-ray spectroscopy, Carbon, Diamonds, Carbides, Silicon compounds, Polymers, Graphite, Aromatic compounds, Plastics, Fibers (Synthetic), Textiles, Lubricants, Metalorganic compounds, Isocyanate plastics, Heterocyclic compounds, Amines, Refractory materials, Refractory metals & alloys.

This report summarizes analytical research on experimental organic and inorganic materials using as the main approach such techniques as infrared, far infrared, ultraviolet and visible absorption spectroscopy, electrical p9ocedures, gas chromatography, X-ray and spectrographic methods, mass spectroscopy, and organic and inorganic chemical analysis. (Author)

AD-427 107 Div. 4
OTS price $2.60

Brown U., Providence, R. I.
CORRELATION OF PHOSPHORUS DISPLACEMENTS.
Final technical rept.
1 Dec 63, 28p.
Grant DA CML18 108G18
Unclassified report

Descriptors: (*Reaction kinetics, Theory), (*Thermodynamics, Chemical bonds), (*Chemical bonds, Reaction kinetics), Tables, Ions, Organic nitrogen compounds, Organic sulfur compounds, Organic phosphorus compounds, Halides, Nitrogen compounds, Sulfur compounds, Phosphorous compounds, Arsenic compounds, Aromatic compounds, Acids, Water, Bases (Chemistry), Electrical properties, Oxidation, Ionization, Dipole moments, Chemical equilibrium.

In summary it may be stated that for correlations of rate data in hydroxylic media the double-scale equations of Edwards give excellent results for displacements on most substrates. The n (nucleophilic constant) values of Swain and Scott are good only for displacement on tetrahedral carbon again in essentially hydroxylic media. The rates of nucleophiles which are subject to the alpha effect do not follow even the polarizability basicity scale of Edwards in majority of the cases. (Author)

AD-427 129 Div. 4, 14
OTS price $1.00

Union Carbide Consumer Products Co., Parma, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME XXVII. CARBONIZATION STUDIES OF POLYNUCLEAR AROMATIC HYDROCARBONS,
by I. C. Lewis and T. Edstrom. Nov 63, 27p.
Contract AF33 616 6915, Projs. 7350, 7381; Tasks 735002, 738102
WADD TR61 72, Vol. 27 Unclassified report
Report on Refractory Inorganic Non-Metallic Materials.

Descriptors: (*Aromatic compounds, Pyrolysis), (*Polycyclic compounds, Pyrolysis), (*Hydrocarbons, Pyrolysis), (*Graphite, Production), Absorption spectrum, Spectra (Visible & ultraviolet), Spectra (Infrared), Molecular structure, Ketones, Additives.

The variation of graphite properties with chemical structure is illustrated for synthetic graphites prepared from 35 pure aromatic compounds. Detailed chemical and physical studies have been directed to the carbonization of two model aromatic hydrocarbons, acenaphthylene, and 9,9'-bifluorenyl. These compounds exhibit extremes in graphitization behavior and the chemical reaction mechanisms are found to be consistent with the nature of the final graphitic products. Carbonization studies have been extended to the effects of aromatic quinone additives on the carbonization behavior of polynuclear aromatic hydrocarbons. Quinones are shown to effect a general increase in coking value of the polynuclear aromatics and of complex aromatic mixtures. The mechanisms of these interactions are discussed. (Author)

AD-427 135 Div. 4
OTS price $8.10

Washington U., Seattle.
CHEMICAL ACTIVATION,
by B. S. Rabinovitch and M. C. Flowers. Jan 64, 1v.
Contract Nonr47736, Task 051 217
Unclassified report

Descriptors: (*Reviews, Heat of activation), (*Heat of activation, Chemical reactions), (*Molecules, Heat of activation), (*Chemical reactions, Heat of activation), Excitation, Reaction kinetics, Surfaces, Energy, Decomposition, Molecular association, Exchange reactions, Luminescence, Recombination reactions, Displacement reactions, Cycloalkanes, Hydrogen, Nitrogen, Oxygen, Chlorine, Dissociation, Bibliographies, Alkenes, Monocyclic compounds, High-temperature research, Molecular isomerism, Nitrogen compounds, Chlorine compounds, Cryogenics, Chlorides, Oxides.

This review brings together known examples of chemical activations systems, which have been accumulating increasingly in recent years, in order to clarify their nature and to exemplify their usefulness. The major emphasis is on activated molecules produced in electronic ground states; these are the simplest systems. Brief mention of some reactions involving electronic excitation will be given, however, since these include important examples of chemical activation. Some systems, such as atom recombination, have been studied in great detail in recent years and cannot be considered here at length. Ion-molecule activation reactions are arbitrarily omitted. Many chemical activation systems are not amenable to useful discussion, either because of their complexity or because insufficient data are available. Only some of these need be mentioned. The present review is not concerned with experimental techniques. (Author)

AD-427 250 Div. 4
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
MATERIALS AND STRUCTURES.
Semiannual technical rept. 1 Jan-30 June 63,

separation of noise and signal when the noise characteristics or statistics are unknown, and even where the processes are non-stationary. Ramifications of the correlation shift are an improvement in signal-to-noise ratio (even when noise characteristics are known), and capability for measurement of velocity, signal source direction, and signal and noise and channel characteristics. (Author)

AD-427 618 Div. 2
OTS price $9.60

Geophysics Corp. of America, Bedford, Mass.
A NEW METHOD FOR ATMOSPHERIC TEMPERATURE DETERMINATION.
Scientific rept. no. 3.
by Raymond A. Minzner, Gerhard Sauermann and Lennart R. Peterson. June 63, 112p. TR63 9A
Contract AF19 628 1633, Proj. 7673, Task 76731
AFCRL 63 661 Unclassified report

Descriptors: (*Atmosphere, Temperature), (*Temperature, Measurement), Acceleration, Gravity, Density, Numerical analysis, Equations, Errors, Analysis, Molecular weight, Planetary atmospheres, Optimization, Integration.

Number-density-versus-altitude data for two gases having large differences in molecular weight permit the accurate determination of the temperature of planetary atmospheres in diffusive equilibrium. A well-known equation relating temperature and number density of a single gas when applied alternately to the heavy and light gases determines a temperature-altitude profile with associated uncertainties which are minimized by an iterative process. A new equation simultaneously involving both the light-and heavy-gas number densities permits accurate temperature calculations in a single-step process. This dual-gas equation applied to the upper half of a region of observed number-density data, together with the heavy-gas-down equation applied to the lower half of the region provides a minimum-error, temperature-altitude profile over the entire altitude range of number-density data. A rigorous error analysis demonstrates how the integration limits may be optimized. (Author)

AD-427 858 Div. 2
OTS price $9.60

Deutscher Wetterdienst, Frankfurt (Germany).
EMPIRICAL INVESTIGATIONS ON THE LAYERING OF AIR PRESSURE, TEMPERATURE, AND DENSITY.
Final rept.,
by Heinrich Faust. Sep 63, 1v.
Contract DA91 591EUC2174
Unclassified report

Report on Project Cell Structure of the Atmosphere.

Descriptors: (*Atmosphere, Models (Simulations)), Theory, Pressure, Temperature, Density, Meteorology, Statistical tests, Tropopause, Experimental data, Curved profiles, Statistical processes, Weather forecasting.

AD-427 879 Div. 2
OTS price $10.10

Ionosphere Research Lab., Pennsylvania State U., University Park.
THE IONIC STRUCTURE OF THE IONOSPHERE,
by W. Swider. 15 Dec 63, 124p. Scientific rept. 201
Contract AF19 628 3842, NSF Grant G18983, Proj. 8605, Task 860502
AFCRL 63 913 Unclassified report

Report on Ionospheric Research.

Descriptors: (*Ionosphere, Ions), (*Ions, Ionosphere), Solar radiation, Recombination reactions, Analysis, Atmosphere, Mathematical models, Atoms, Molecules, Distribution, Functions, Earth, Nitrogen, Diffusion, Theory.

This work is an aeronomic study of the behavior of positive ions in the 100-300 km region of the ionosphere. The production of ions due to solar radiation and the recombination processes for ions are analyzed in terms of a basic atmospheric model. The ion-neutral atom (molecule) reactions are determined in terms of the vertical distribution of the principal neutral constituents. Ionic production is treated as a function of the solar zenith angle. Sunrise (or sunset) production is studied in terms of functions which take the sphericity of the earth into account. Practical functions are derived for atmospheric models having gradients of scale height, i.e., models which include a variation of temperature and mean molecular mass with height. A photoequilibrium (daytime) solution of the vertical distribution of ions is constructed which is shown to conform with the observational data. The nighttime ionosphere is investigated by means of certain decay schemes. The rapid change of the electron density at dawn is explained as the natural consequence of the effect of production. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-427 565 Div. 3
OTS price $3.60

Dugway Proving Ground, Utah.
SURVEILLANCE TEST (ENVIRONMENTAL) OF GRENADE, HAND RIOT, CS, ABC-M7A2; DPGR 387.
21 Jan 64, 38p.
DPGR 387 Unclassified report

Descriptors: (*Grenades, Non-lethal agents), (*Non-lethal agents, Grenades), Storage, Handling, Pyrotechnics, Desert tests, Cold weather tests, Degradation, Environmental tests.

Tests were conducted to determine the effects of environment upon the storage and functioning of the grenade, hand, riot, CS, ABC-M7A2, in climates represented by the arctic, desert, temperate, and tropic test sites. The grenade is a 28-gauge steel cylinder 2.5 inches in diameter and 4.5 inches long. It is ignited by a standard M201A1 fuze threaded into the grenade top. It is filled with approximately 275 grams of CS agent - pyrotechnic mix in the form of a pressed solid with a slightly tapered hole through the center. The top of the filling and the hole through it are coated with a starter mixture. The agent aerosol cloud is emitted through a 1/2-inch hole in the center of the bottom of the grenade and through three 3/16-inch holes in the top of the grenade. The agent dissemination holes are covered with pressure-sensitive tape to protect the filling from moisture. These tapes are blown off when the grenade is ignited. The grenade will, in general, function satisfactorily after storage for periods ranging from 23 to 29 months at the arctic, desert, temperate, and tropic test sites. The tendency of violent reaction after periods of approximately 12 months, depending upon the site, is considered unsatisfactory. This tendency, however, is not of such a nature as to render the grenade wholly unsatisfactory.

AD-427 787 Div. 4
OTS price $1.60

Culver Military Academy, Ind.
COORDINATION STUDIES WITH BERYLLIUM CHLORIDE AND SILICON-NITROGEN POLYMERS,
by Ronn N. Minne. Nov 63, 10p.
Contract Nonr371100
Unclassified report

Descriptors: (*Complex compounds, Synthesis (Chemistry)), (*Silicon compounds, Polymers), (*Polymers, Nitrogen compounds), (*Stabilization, Hydrolysis), Beryllium compounds, Chlorides, Silanes, Chlorine compounds, Amines, Aliphatic compounds, N-heterocyclic compounds, Molecular weight, Metalorganic compounds, Alkanes.

The direct analogs of the methyl silicones can be prepared by reaction of dimethyldichlorosilane with ammonia. The products of the reaction are mainly the trimer and tetramer with various amounts of polymeric material remaining as a distilllation residue. The products of this reaction display a tendency of silicon nitrogen systems--that of forming small rings instead of polymers. The practical utility of silicon-nitrogen polymeric systems is limited by the tendency of the Si-N bond to hydrolize forming the corresponding siloxanes. This tendency can be reduced by placing large substituents on silicon, thus partially sterically blocking the lone pair of electrons on nitrogen in Lewis base reactions with proton donating reagents which will cleave the Si-N bond. The present investigation is concerned with an attempt to tie up the lone pair of electrons on nitrogen by coordination with metallic ions. (Author)

5. COMMUNICATIONS

AD-427 098 Div. 5, 30
OTS price $3.60

Page Communications Engineers, Inc., Washington, D. C.
SPACE COMMUNICATIONS TECHNIQUES.
Dec 63, 28p.
Contract AF30 602 2403, Proj. 4519, Task 451901
RADC TDC63 111, S1 Unclassified report

Descriptors: (*Instrumentation, Communication satellites (Passive)), Antennas, Lens antennas, Reflectors, Radar antennas, Tests, Test methods, Very high frequency, Ultrahigh frequency, Radar duplexers.

The modification and completion of instrumentation for use in communications experiments with passive satellites are described. Boresighting instrumentation was installed at the Floyd test site near Rome, N. Y., and modifications for optical viewing were made to a 60-ft antenna reflector at that site. The cassegrain subreflector for the Trinidad site antenna was rebuilt and tested. Instrumentation for pulse operation at the communications frequency at the Trinidad site was completed with the installation of a duplexer and a receiver protector. (Author)

AD-427 200 Div. 5, 23
OTS price $4.60

Military Research and Development Center (Thailand).
TEST OF NAVAL ORDNANCE TEST STATION PORTABLE PUBLIC ADDRESS SYSTEM,
by Joseph P. Martino. May 63, 38p.
Unclassified report

Descriptors: (*Public address systems, Operation), (*Military personnel, Performance tests), Test methods, Training, Reliability.

This report describes tests of a self-contained portable public address system developed by Naval Ordnance Test Station. Speaker coverage patter in open country, depth of penetration in jungle, and shadowing effects of hills were determined. (Author)

AD-427 784 Div. 5, 25, 12
OTS price $9.10

Northrop Corp., Hawthorne, Calif.
TERMINAL GUIDANCE SIMULATOR STUDY PROGRAM IMAGE EVALUATION. VOLUME I THEORY OF IMAGE EVALUATION.
Jan 64, 99p. Rept. no. NOR 64 10
Contract Nonr364800
Unclassified report

Descriptors: (*Images, Theory), (*Television equipment, Images), Optical properties, Communication theory, Integral transforms, Terminal guidance, Simulation.

Objective methods are presented for assessing characteristics of optical systems as opposed to the usual subjective approach. The objective characteristics considered were transfer characteristic, the sine wave response, and the signal-to-deviation ratio. As a result of the image evaluation experiment and associated studies conducted, methods are now available to assess the characteristics of imaging systems prior to design. A common language is provided to describe the performance of elements in an optical system so that the complete system can be designed from the characteristics of the constituent elements. In order to effectively use the techniques developed, the requirements and the environment in which the system is to be used must be well defined. (Author)

6. DETECTION

AD-427 010 Div. 6
OTS price $1.60

Woods Hole Oceanographic Institution, Mass.
SONAR RESEARCH.
Quarterly progress rept. 1 July-30 Sep 63.
Oct 63, 13p. Ref. no. 63 35,
Contract NObsr89464
Unclassified report

Descriptors: (*Sonar, Ocean bottom), (*Marine biological noise, Identification), (*Underwater sound, Sound transmission), (*Sonar targets, Target discriminators), Underwater sound signals, Ocean botton sampling, Sea water.

Research included further investigations of reflection of sound from the sea floor, sound transmission via near-surface paths in deep wa er, and ambient noise of marine animal origin. Da a reduction and analysis programs have conti ued through-out this period. (Author)

AD-427 013 Div. 6
OTS price $1.60

Woods Hole Oceanographic Institution, Mass.
SONAR RESEARCH.
Progress rept., 1 Oct-31 Dec 62.
May 63, 7p. Reference no. 63 20
Contract NObsr72521
Unclassified report

Descriptors: (*Sonar, Research program adminis-

by T. S. Lee and W. H. Childs. 20 Nov 63, 7p.
TDR 169-3240 21 TR1
Contract AF04 695 169
SSD TDR63 323 Unclassified report

Descriptors: (*Solid solutions, Electrochemistry), (*Electrochemistry, Solid solutions), Nickel compounds, Iron compounds, Potassium compounds, Iodides, Reduction (Chemistry), Ions, Oxidation, Solid state physics, Organic compounds, Organic materials.

New electrochemical techniques for the study of solids were applied to iron and nickel in solid solution in potassium iodide. The electroreductions of these ions were found to require no overpotential, in contrast to the large overpotentials required for the corresponding reductions in aqueous solution. These results show that metal ions in solid environments are sometimes more reactive than the same ions in common liquid solvents. It was found that finely divided organic compounds in a matrix of solid salt hydrate can be reduced electrochemically. The types of compounds reduced were quinones, azo compounds disulfides, aliphatic halogen compounds, and compounds containing conjugated double bonds. The reductions of some compounds, such as anthracene, required smaller overpotentials than did the corresponding reductions in any liquid solvent previously investigated. (Author)

AD-427 414 Div. 4, 30
OTS price $6.60

RCA Labs Div., Radio Corp. of America, Princeton, N. J.
TRACE ANALYSIS OF SOLIDS BY MASS SPECTROMETRY.
Scientific rept. no. 1, 16 Apr 62-30 Sep 63,
by R. E. Honig. Oct 63, 62p.
Contract AF19 628 446, Proj. 4608, Task 460802
AFCRL 63 530 Unclassified report

Descriptors: (*Mass spectroscopy, Solids), (*Ion sources, Mass spectroscopy), (*Lasers, Mass spectroscopy), Boron, Rare earth elements, Polycyclic compounds, Aromatic compounds, Pyrolysis, Impurities, Ion beams, Instrumentation, Sparks, Radiofrequency, Ruby, Solids, Tables.

A double-focusing mass spectrograph was modified, and methods developed, to permit the analysis of special solid samples. New ion sources were developed that have a high intrinsic efficiency. A source was developed which employs a laser beam for local heating, to permit the analysis of microregions. (Author)

AD-427 683 Div. 4, 14
OTS price $7.60

National Engineering Science Co., Pasadena, Calif.
NEW CHEMICAL EXTINGUISHING AGENTS FOR ROCKET PROPELLANT AND METALLIC FIRES.
Rept. for Feb 62-Oct 63,
by Herbert Landesman and Eugene B. Klusmann.
Dec 63, 65p.
Contract AF33 657 8015, Proj. 8119, Task 811932
RTD TDR63 4208 Unclassified report

Report on Checkout and Hazard Control Techniques.

Descriptors: (*Fire extinguishers, Chemicals), (*Synthesis (Chemistry), Fluorine compounds), (*Fires, Propellants), (*Flammability, Metals), (*Hazards, Fire safety), Hydrazine, Boron compounds, Borates, Phosphates, Silicates, Sulfites, Esters, Organoboranes, Fluorides, Polymers, Stability, Heat, Hydrolysis, Hydrazine derivatives, N-heterocyclic compounds, Corrosion, Compatibility, Polyethylene plastics, Rubber, Synthetic rubber, Elastomers, Silicone plastics, Infrared spectroscopy, Mass spectroscopy, Nuclear magnetic resonance, Chromatographic analysis.

Fluoroalkyl esters of boric, phosphoric, silicic and sulfurous acids, boroxines and alkoxydifluoroborane trimers were prepared as possible extinguishants for metallic and/or exotic propellant fires. Their mode of action is to form an inorganic oxide coating on metals. (Author)

AD-427 749 Div. 4, 14, 10
OTS price $.50

Monsanto Research Corp., Dayton, Ohio.
MOLECULAR STRUCTURE AND MATERIALS CHARACTERIZATION,
by J. E. Katon. Nov 63, 10p.
Contract AF33 616 8465; Proj. 7360; Task 736005
RTD TDR63 4104 Unclassified report

Descriptors: (*Carboxylic acids, Molecular structure), (*Organic sulfur compounds, Molecular structure), (*Isocyanate plastics, Molecular structure), (*Carbon, Mass spectroscopy), (*Mass spectroscopy, Beryllium), Impurities, Oxygen, Infrared spectroscopy, Aromatic compounds, Sulfides, Sulfoxides, Graphite, Diamonds, Carbides, Propellants, Storage, Stability, Binders, Elastomers, Styrene plastics, Synthesis (Chemistry), Bromine compounds, Halogenated hydrocarbons.

Research on the determination of molecular structures, characterization of materials, and the development and application of various analytical techniques is summarized. The three research projects, reported in detail elsewhere, concern infrared spectra/structure correlations of aliphatic monocarboxylic acids and organosulfur compounds; solid state mass spectrometric studies; and the characterization of polyurethane elastomers with special reference to those used as binders for solid propellants. (Author)

AD-427 772 Div. 4
OTS price $2.60

IIT Research Inst., Chicago, Ill.
THERMOCHEMICAL AND STRUCTURAL STUDIES ON ALKALI METAL OZONIDES.
Final rept.,
by Andrew J. Kacmarek. June 62, 23p. Rept. no. ARF3151 11
Contract AF49 638 618; Proj. 9760; Task 37600
AFOSR 2983 Unclassified report

Descriptors: (*Ozonides, Synthesis (Chemistry), (*Alkali metals, Ozonides), Molecular structure, Thermochemistry, Cesium compounds, Lithium compounds, Potassium compounds, Sodium compounds, Rubidium compounds, Ammonium compounds, X-Ray diffraction analysis, Crystal structure, Paramagnetic resonance, Electrons, Spectra, Organic solvents, Amides, Amines, Liquefied gases, Ammonia, Dynamics, Decomposition, Infrared (Spectroscopy), Spectra (Visible and ultraviolet).

Some of the physical and chemical properties of alkali metal ozonides were determined. In addition, ammonium ozonide and tetramethylammonium ozonide, which are similar to alkali metal ozonides, were prepared and their physical and chemical properties determined. A large part of the program was devoted to determining the crystal structure of potassium ozonide by the powder method of x-ray diffraction. (Author)

7. ELECTRICAL EQUIPMENT

AD-427 070 Div. 7
OTS price $3.60

Mallory, P. R. and Co., Inc., Burlington, Mass.
CELL EQUALIZATION TECHNIQUES.
Final rept.,
by Peter J. Whoriskey. Dec 63, 28p.
Contract AF33 657 8749, Proj. 8173, Task 817304 18
RTD TDR63 4187 Unclassified report

Descriptors: (*Solar cells, Storage batteries), (*Storage batteries, Solar cells), (*Alkaline cells, Solar cells), Nickel, Cadmium, Diodes (Semiconductor), Germanium, Life expectancy, Silicon, Silver, Zinc, Electric discharges, Batteries and components.

A space vehicle power supply consists of certain types of hermetically sealed alkaline battery cells coupled with solar cells. During usage these alkaline battery cells, series connected, are repeatedly subjected to charge-discharge cycles that can produce cell failure. These failures are, in turn, attributable to inherent cell differences intensified by cycling rate, overall cycling time and depth of discharge. The prime failure modes consist of: (a) unequal cell charge which causes the evolution of gas in sufficient quantities to destroy the cell, and (b) cell reversal on discharge that effectively cancels the cell from the circuit and ultimately results in cell failure. The objectives of this program were, accordingly, to investigate: (1) methods of equalizing the terminal voltage of the individual cells on charge, and (2) methods of preventing cell reversal upon discharge. To achieve cell equalization, the logarithmic forward volt-ampere characteristic of semiconductor P-N junctions was investigated in depth. Semiconductor diodes were designed and tested for specific V-I slopes and current handling capability. Similarly, the anti-reversal approach consisted of utilizing the low forward drop of especially fabricated Ge diodes which were placed across the cell terminals, in parallel to, but in polarity opposing the equalizer diodes. These diode assemblies materially increased the cycle life of Ni-Cd cells. (Author)

AD-427 134 Div. 7, 10
OTS price $1.60

Battelle Memorial Inst., Columbus, Ohio.
MULTIFUELED THERMAL-ENERGY-CONVERSION SYSTEMS.
Quarterly progress rept. no. 5, 1 July-30 Sep 63,
by H. R. Hazard and D. E. Roop. 30 Sep 63, 12p.
Contract DA36 039sc90838, Proj. 1G6 22001A053 03
Unclassified report

Descriptors: (*Thermoelectricity, Generators), (*Electric power production, Generators), (*Fuels, Thermoelectricity), Steam, Boilers, Charcoal, Energy conversion, Wood, Combustion, Enthalpy, Burning rate, Absorption, Heat, Feasibility studies.

The objective of this task is to investigate the feasibility of utilizing wood, charcoal, coal, or other locally available fuels found in worldwide areas as a heat source for a thermoelectric generator or small engine-driven generator capable of producing 150 watts of electric power. A small steam boiler sized for a 150-watt power source was evaluated with charcoal, wood, and cow dung as fuel. Satisfactory combustion and boiler efficiency were obtained with heat absorption rates from 2 to 8 kw th. Start-up periods were 5 to 10 minutes, depending upon technique and fuel. A second boiler, of minimum size and weight, was designed. (Author)

AD-427 178 Div. 7, 25
OTS price $1.50

Ion Physics Corp., Burlington, Mass.
P-N JUNCTION FORMATION TECHNIQUES.
Quarterly rept. no. 3 (Final), 20 May-1 Sep 63.
Nov 63, 47p.
Contract AF33 657 10505, Proj. 8173, Task 817301 28
RTD TDR63 4125 Unclassified report

Descriptors: (*Solar cells, Semiconductors), (*Semiconductors, Solar cells), (*Photoelectric cells (Semiconductor), Solar cells), (*Silicon, Photoelectric cells (Semiconductor)), Photons, Ions, Impurities, Boron, Phosphorus, Diffusion, Emissivity, Surfaces, Solar radiation, Simulation, Radiation damage, Electron bombardment.

Investigations were continued on spectral response as a function of junction depth in p-on-n-type cells. A further ''blue'' shift was observed with lower implantation energy (100 Kev), the equal photon relative response curve peaking at 6000 angstroms. Graphically determined values of minority carrier diffusion lengths in the surface region show a trend towards values equalling junction depth for low-energy implanted cells. Base diffusion lengths indicate a need for better starting material to obtain more efficient cells. An empirical curve was obtained giving relative efficiencies under solar and W light as a function of implantation energy. P-type cells were implanted with P ions to make n-on-p cells. First cells produced in this manner had efficiencies greater than 5% and spectral responses similar to comparable p-on-n cells. Preliminary radiation damage studies on IPC and commercial cells are reported. (Author)

AD-427 189 Div. 7, 8
OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
EVALUATION OF AN IMPROVED RFI-SUPPRESSING POWER CONDUCTOR,
by Don B. Clark and J. L. Brooks. 13 Jan 64, 28p. Proj. Y F006 09 201
NCEL TR R275
Unclassified report

Descriptors: (*Electric cables, Radiofrequency interference), Attenuation, Electric wire, Vinyl plastics, Chlorides, Silicon alloys, Iron alloys, Environmental tests, Magnetic tape, Resistance (Electrical), Permeability (Magnetic), Corrosion, Test equipment (Electronics), Noise Generators, Cost, Electric insulation.

An improved power conductor for suppressing radio frequency interference (RFI) was developed, consisting of #2 AWG stranded copper wrapped with two layers of 7-mil Silicon Iron (SiFe) magnetic tape and a 50-mil extruded polyvinyl chloride jacket. To evaluate its capability for attenuating RFI and its resistance to deterioration, the lossy conductor was installed on a 3-mile, 3-conductor, 4-kv power line on San Nicolas Island, off the coast of Southern California. Attenuation exceeded that reported for the Fort Huachuca lossy line, at frequencies below 1 mc, and was equal or greater at higher frequencies. T[illegible] stranded conductor's effect on attenuation [illegible]s discussed, and curves are included for comparing the attenuation of solid and stranded conductors wrapped with lossy tape. Ambient noise levels are shown. The severe climate and its effect on the power line are discussed; test methods are described; and future developments are considered. (Author)

tration), Echo ranging, Underwater photography, Underwater sound equipment, Reports, Programming (Computers), Cetacea, Ocean botton, Sound transmission.

A test was made of echo sounders and underwater photographic equipment during this phase of the study. Further development and refinement of methods for processing the data of underwater sound was the prime endeavor. A paper on seismic refraction in the western Mediterranean was completed. (Author)

AD-427 016 Div. 6
OTS price $1.60

Woods Hole Oceanographic Institution, Mass.
SONAR RESEARCH.
Quarterly progress rept., 1 Jan-31 Mar 63.
Sep 63, 9p. Ref no. 63 31
Contract NObsr72521
Unclassified report

Descriptors: (*Sonar, Research program administration), Echo ranging, Ocean bottom, Noise, Programming (Computers), Reports, Hydrophones.

This is a status report of the period 1 January-31 March 1963. Work was concentrated on analysis of data taken in sound transmission via near-surface paths, studies of the bottom reflection process at near-normal incidence, and study of ambient noise caused by marine animals. Computations of sound ray paths and intensities were made based on a simple theoretical model. (Author)

AD-427 092 Div. 6, 8
OTS price $4.60

Raytheon Co., Burlington, Mass.
PHOTOELECTRIC MILLIMETER WAVE DETECTOR,
by P. R. Bratt and G. F. Giggey. Dec 63, 43p.
Contract AF30 602 3015, Proj. 5573, Task 557301
RADC TDC63 502 Unclassified report

Descriptors: (*Detectors, Millimeter waves), (*Millimeter waves, Detectors), (*Semiconductor devices, Detectors), Photoelectric cells (Semiconductor), Indium alloys, Antimony alloys, Gallium alloys, Arsenic alloys, Germanium, Magnetic fields, Sensitivity, Performance tests, Photoconductivity, Cryogenics.

This program is concerned with the application of semiconducting materials to the problem of detection of electromagnetic radiation in the millimeter and submillimeter wavelength range. The method of approach involves the use of the internal photoelectric effect (i.e., photoconductivity) in certain semiconductor materials at very low temperatures. The program can be broken down into four main phases. a) investigation of indium antimonide in a magnetic field, b) investigation of gallium arsenide and/or indium arsenide in a magnetic field, c) investigation of germanium and its behavior under stress, and d) fabrication of experimental and breadboard model detectors. Investigations on indium antimonide in a magnetic field are continuing. Samples of gallium arsenide have been acquired and measurements on this material are beginning. A paper summarizing the ''state of the art'' in photoconductive detectors for the millimeter and submillimeter wave region was prepared and presented at the 19th Annual National Electronics Conference. The paper is reproduced as an appendix to this report. A theoretical analysis has been performed to establish the limits of sensitivity of the various types of long wave-length photoconductive detectors which have been developed and the performance of actual detectors is compared with the theoretical limit.

AD-427 150 Div. 6, 16
OTS price $16.00

Biosearch Co., Boston, Mass.
DETECTION OF HUMANS IN CONCEALED PREPARED POSITIONS.
Final rept.,
by Alfred T. Kornfield. July 63, 246p.
Contract DA19 020AMC0122R
Unclassified report

Descriptors: (*Biology, Detectors), Sensory mechanisms, Ecology, Skin, Reflection, Excretion, Closed ecological systems, Electromagnetic waves, Vibration, Sound, Electrical properties, Man, Limited war, Signals, Human engineering, Spectroscopy, Chemoreceptors, Bibliographies, Smell, Secretion, Detection, Infrared detectors.

This study concerned itself with a review of the diverse attributes of man yielding signals, the signal modifications in environment, and various sensing concepts in examining the capabilities of biosensing techniques for the detection of humans in concealed positions. In considering human signal sources and attributes, emphasis was placed on assembly of a catalog of chemical substances excreted through all body portals; for comparative analysis, other human physical attributes and signals were set down (emission, reflection, proximity properties), resulting in an inventory of most of the major signals produced by man. Environmental modification of chemical signals from man, by substances from plants and animals, weather effects, etc; was augmented also by comparative data on effects of environment on physical signal transmission. Comparative data on chemical and physical sensing of chemical substances and physical phenomena are presented. (Author)

AD-427 253 Div. 6, 8, 2
OTS price $1.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
A CLOUD SURVEILLANCE RADAR UTILIZING A MASER AS A LOW-NOISE PREAMPLIFIER,
by E. Frost and M. Katzman. Sep 63, 12p.
DA Task IG6 22001A056 03
AERDL TR2399 Unclassified report

Descriptors: (*Meteorological radar, Masers), X-band, Preamplifiers, Sensitivity, Ruby, Signal-to-noise ratio, Ranges (Distance), Equations, Microwave equipment, Clouds.

This report describes the application of an X-band maser as a preamplifier for a weather radar. It was desirable to increase the sensitivity of the radar in order to observe greater cloud detail in addition to achieving greater range. The possible ways of accomplishing increased sensitivity include increasing transmitter power, optimizing bandwidth and signal processing to the information rate, shifting the operating frequency, and optimizing antenna design. The application of a low-noise preamplifier was chosen for this investigation. The results of this application are presented, and the system, consisting of a traveling wave ruby maser and the AN/MPS-34 radar, is described. (Author)

Studies of factors affecting the properties of polycrystalline CdTe film grown by the vapor reaction process are discussed and a variety of molybdenum substrates are compared. No real differences are found. Rough measures of temperature effects and tellurium flow rate on film growth rate are reported. The tailoring process was changed in two runs with efficiency markedly improved. The principal conclusion of a study of evaporated metal contacts is that gold is the best electrode material of the ten examined. (Author)

AD-427 727 Div. 7
OTS price $8.60

Eagle-Picher Co., Joplin, Mo.
INVESTIGATIONS LEADING TO THE DESIGN OF A RELIABLE SEALED NICKEL-CADMIUM CELL.
Quarterly progress rept. no. 2, 1 Aug-31 Oct 63, bw C. O. Gosch. 30 Nov 63, 129p. Rept. no. 6
Contract DA36 039AMC00135, Proj. 1G6 22001A053 02
Unclassified report

Descriptors: (*Storage batteries, Materials), (*Alkaline cells, Storage batteries), Nickel, Cadmium, Electrolytes, Additives, Potassium compounds, Hydroxides, Zinc compounds, Oxides, Electric discharge, Battery separators, Polyethylene plastics, Lithium, Storage, Lithium compounds, Tables, Nomographs, Reliability, Capacitance.

Data accumulated in studies made of the several factors in design experiments and the response information obtained in the following have been analyzed: A Self-Discharge Experiment (Three-Month Storage); A Charge Acceptance Experiment; A Limited Overcharge Experiment. The design experiment was delineated and the response data were detailed for the factors: (A) electrolyte concentration, (B) additives, (C) type of sintered plaque, (D) type of separation, (E) type of negative plate, (F) type of cell. These design factors were carried forward at the several levels previously reported (Quarterly Progress Report No. 1, Report No. 5 Contract No. DA-36-039-AMC-00135 (E). The results of the analysis of the responses of the cells studied in the above experiments have been recorded and the influences of the various parameters have been shown. (Author)

AD-427 737 Div. 7, 27
OTS price $9.10

Ion Physics Corp., Burlington, Mass.
FEASIBILITY AND DESIGN STUDY FOR ELECTROSTATIC GENERATORS.
Final rept. Apr 60-Oct 63,
by A. S. Denholm, C. N. Coenraads, F. J. McCoy, J. E. Lavelle and M. Thayer. 15 Jan 64, 99p.
Contract AF33 616 7230; Proj. 8128; Task 812808
WADD TR61 105, vol.3 Unclassified report

Descriptors: (*Electrostatic generators, Space propulsion), (*Controlled atmospheres, Electrostatic generators), Dielectric properties, Electric fields, Glass Cathodes, Titanium alloys Aluminum alloys, Molybdenum alloys, Chromium alloys, Nickel alloys, Stainless steel, Grain structures (metallurgy), Austenite, Martensite, Ceramic materials, Acrylic resins, Cobalt alloys, Tungsten alloys, Vanadium alloys, Coatings, Epoxy elastics, Halocarbon plastics, Feasibility studies, Electric insulation.

The results of studies on the insulation of high voltage across 1-mm gaps are reported. This effort supported the development of vacuum-insulated electrostatic generators, and electric fields as high as 115 kV/mm have been attained. One of the major problems is the reproduction of these field strengths with the large areas which exist in generators. Brushless operation of electrostatic generators has been achieved, and progress in machine performance and design are discussed. (Author)

AD-427 754 Div. 7
OTS price $1.60

Plasma Physics Research Lab., U. of Minn., Minneapolis.
RELIABLE SPARK GAP FOR CAPACITOR BANK SWITCHING,
by W. D. Bunting, Jr. Nov 63, 13p.
Proj. 7073; Task 7073 01
ARL 63 219 Unclassified report

Descriptors: (*Capacitors, Gas discharges), (*Gas discharges, Electric switches), (*Electric switches, Capacitors), Inductance, Electric current, Electric potential, Anodes (Electron tubes), Cathodes (Electron tubes), Corrosion.

Hold off reliability, switching time, and jitter are measured for a newly designed spark gap switch to be used in a 3 kilojoule capacitor bank. Time study photographs of the breakdown are used to explain the existence of two distinct modes of switch operation depending upon a critical value of the working voltage. (Author)

AD-427 766 Div. 7, 4
OTS price $4.60

Pennsylvania State U., Mineral Industries Experiment Station, University Park.
FURTHER INVESTIGATIONS OF POROUS FLOW-THROUGH ELECTRODES OF PLATINUM BLACK,
by P. Palasi and L. G. Austin. Aug 63, 1v.
Rept. no. 5
Contract DA49 186 502QRD917
Unclassified report

Descriptors: (*Fuel cells, Electrodes), (*Electrodes, Platinum), Porosity, Adsorption, Thickness, Alcohols, Aldehydes, Carboxylic acids, Potassium compounds, Hydroxides, Sulfuric acid, Hydrochloric acid, Tin compounds, Chlorides, Electric currents, Density, Polarization, Electrochemistry, Design, Effectiveness.

Further tests were made on the porous, flow-through electrodes described previously. It was confirmed that for methanol, formaldehyde and formate at high current densities, the observed limiting currents are considerably less than theoretical values. The same electrodes using the stannous-stannic couple as reactant gave exact agreement between the observed and limiting current. It is concluded that the limiting factor present for the hydrocarbon fuels is not a mass transport factor. In general, the theoretical predictions of the effect of flow-rate, concentration on the polarization curves are valid at lower current densities, but fail near the region of the abnormal limiting current. (Author)

AD-427 774 Div. 7, 25
OTS price $1.10

Martin Marietta Corp., Baltimore, Md.
RESEARCH PROGRAM ON CLOSED-CYCLE MAGNETOPLASMADYNAMIC ELECTRICAL POWER GENERATION WITH NONEQUILIBRIUM IONIZATION.
Interim scientific rept.,
by M. E. Talaat. 31 Dec 63, 7p.
Contract Nonr3866 00; ARPA Order 326 327
Unclassified report

Division 7 - ELECTRICAL EQUIPMENT

AD-427 227 Div. 7, 8
OTS price $1.10

Friez Instrument Div., Bendix Corp., Baltimore, Md.
DESIGN, DEVELOPMENT AND FABRICATION OF BAROSWITCH, REMOTE XM-10; BAROSWITCH PRESET XM-11; AND CONTROL BAROSWITCH SETTING: XT-4126.
Progress rept. no. 27, 1 Oct-30 Nov 63,
by D. M. Potter and G. F. Hobday. 9 Dec 63, 4p.
Contract DA36 034ORD2890A
Unclassified report

Descriptors: (*Pressure switches, Barometric pressure), Drift, Resistance (Electrical), Diaphragms (Mechanics), Cleaning, Tests, Environmental tests, Virbration, Vibration isolators.

AD-427 285 Div. 7, 12
OTS price $6.60

Monsanto Research Corp., Dayton, Ohio.
HIGH TEMPERATURE THERMOELECTRIC RESEARCH.
Quarterly progress rept. no. 1, 15 Sep-31 Dec 63,
by C. M. Henderson. 31 Dec 63, 60p.
Contract AF33 615 1084, Proj. 8173, Task 817302 9
Unclassified report

Descriptors: (*Generators, Thermoelectricity), (*Energy conversion, Thermoelectricity), Spacecraft, Nuclear energy, Solar radiation, Performance (Engineering), Tests, Experimental data, Failure (Mechanics), Thermocouples, Vibration, Design, Configuration, Temperature, Weight, Electric arcs, Plasma medium, Flame spraying, Auxiliary power plants, Coatings, Wire, Molybdenum, Graphite, Radioactive isotopes, Power, Test facilities, High temperature research, Power supplies, Aerospace craft, Electric power production.

A study is presented of the feasibility of utilizing high temperature thermoelectric generators, powered with nuclear and solar heat sources for long-lived power supplies for aerospace vehicles. A 50-watt laboratory generator, fabricated of segmented thermoelements and preliminarily tested, was subjected to sustained testing with its hot-junction 1215 C, its cold junction 570 C and in a vacuum of 10 to the -5th power to 10 to the -6th power Torr. This generator exhibited a 12.8 watt/lb performance ratio at an overall thermal efficiency of 2%. At the end of 266 hrs continuous performance, an unstable power output condition of the generator halted the test. Investigation of the causes of the unstable power output showed that the intermediate junction design temperature of the segmented n-type thermoelements used in the generator had been exceeded by about 100 C. No damage to the high temperature (850-1200 C) thermoelectric segments or junction materials was sustained. (Author)

AD-427 297 Div. 7, 25
OTS price $11.50

Westinghouse Electric Corp., Pittsburgh, Pa.
LONG LIFE CLOSED LOOP MHD RESEARCH AND DEVELOPMENT UNIT,
by R. L. Hundstad, F. A. Holmes, J. G. DeSteese, W. S. Emmerich and R. E. Voshall. Oct 63, 1v.
Contract AF33 657 8311, Proj. 8173, Task 817306 11
RTD TDR63 4019 Unclassified report

Descriptors: (*Power supplies, Magnetohydrodynamics), (*Magnetohydrodynamics, Electric power production), Fluids, Electromagnets, Tantalum, Vaporization, Gas ionization, High-temperature research, Generators, Spaceborne, Vapors, Helium, Cesium, Electric motors, Life expectancy.

Electric power production in space will require lightweight generators using a nuclear reactor as heat source and a hot radiator as heat sink. Because of its capability for operation at high temperatures and absence of moving parts, the MHD generator is an attractive device. A closed-loop MHD generator and motor research unit was designed and built to produce MHD conditions and to gain experience in the operation of MHD generators suitable for space applications. Component parts of the machine were individually tested before assembly. After assembly the first test used helium and cesium as the working fluid. Future plans include tests with different vapors and duct materials together with the incorporation of non-thermal ionization and possibly superconducting magnets. (Author)

AD-427 334 Div. 7, 17
OTS price $3.50

General Atomic Div., General Dynamics Corp., San Diego, Calif.
THERMOELECTRIC MATERIALS AND FABRICATION.
Final rept.,
by E. Brady, H. Jansen, R. Moss, R. Overmyer and D. Peery. Feb 63, 213p. Rept. no. GA3754
Contract NObs84776, Proj. SR0071201
Unclassified report

Descriptors: (*Thermoelectricity, Materials), (*Electric power production, Materials), (*Generators, Thermoelectricity), (*Semiconductors, Thermoelectricity), Stresses, Zinc alloys, Antimony alloys, Lead alloys, Tellurium alloys, Gold, Processing, Tensile properties, Elasticity, Compressive properties, Thermal expansion, Diffusion, Bonding, Loading (Mechanics), Electric insulation, Encapsulation, Manufacturing methods, Rupture, Resistance (Electrical), Test equipment, Life expectancy, Bismuth alloys, Impurities, Metal joints, Modules (Electronics), Powder metallurgy.

The results of studies of techniques for improving the technology of thermoelectric power-generating devices are reported. Aspects of the problem covered in the present program include (1) techniques for metallurgical processing of semiconductor materials, (2) methods of forming metallurgical bonds, (3) methods of evaluating materials and bonds, (4) methods of forming electrically insulating, thermally conducting bonds, (5) methods of encapsulation of thermoelectric components, (6) analysis of thermal and mechanical stresses in bond regions, and (7) considerations relevant to the selection of element size and packing density in chemically heated power-generating devices. (Author)

AD-427 608 Div. 7, 25
OTS price $4.60

General Electric Co., Auburn, N. Y.
RESEARCH ON THIN FILM POLYCRYSTALLINE SOLAR CELLS.
Quarterly technical progress rept. no. 5,
1 Oct-31 Dec 63.
31 Dec 63, 35p.
Contract AF33 657 10601; Task 817301 33
Unclassified report

Descriptors: (*Solar cells, Vapor plating), (*Cadmium alloys, Tellurium alloys), (*Crystal structure, Solar cells), Molybdenum, Copper, Tellurium, Cadmium, Nickel, Gold, Impurities, Gallium, Electrodes, Aluminum, Silver, Chromium, Beryllium, Bismuth, Antimony, Lead, Diodes, Electrical conductance, Electric potential, Effectiveness, Reflectors, Indium compounds, Oxides.

Descriptors: (*Failure (Mechanics), Integrated circuits), (*Semiconducting films, Failure (Mechanics)), Environmental tests, Transistors, Thermal stresses, Stresses, Cadmiun alloys, Sulfides, Dielectric films, Resistance (Electrical), Humidity, Test equipment (Electronics), Mathematical models.

One hundred and fifty plates, each containing three thin film active devices were fabricated, and approximately 50 of them were subjected to temperature, humidity, and electrical stresses under controlled conditions. The initial objective, which was the establishment of stress levels leadings to significant changes of device parameters within one or two weeks, was achieved in all cases. For thin film triodes the parameter found to be most sensitive to aging effects was the d.c. gate voltage necessary to obtain a standard power output. An analytical expression for a high temperature degradation case has been found with strong indications that the corresponding failure mechanism occurs at the SiO-CdS interface. High humidity stresses produced gradual degradation and partially reversible catastrophic failures. (Author)

AD-427 059 Div. 8, 25
OTS price $2.60

Microwave Associates Inc., Burlington, Mass.
MILLIMETER WAVE COMPONENT DEVELOPMENT (BEAM-PLASMA AMPLIFIER),
by Paul Chorney. Dec 63, 22p.
Contract AF30 602 2948, Proj. 5573, Task 557301
RADC TDR63 477 Unclassified report

Descriptors: (*Microwave amplifiers, Plasma physics), (*Plasma physics, Microwave amplifiers), Microwave networks, Probes (Electromagnetic), Measurements, Plasma medium, Density, Electric currents, Xenon, Electron beams, Scattering, Atoms, Gas ionization, Theory.

Probe measurements are described which show that the plasma column of the PIG discharge has a non-uniform axial density profile. Experiments are also described in which plasma densities of 3 x 10 to the 14th power cm to the -3rd power are measured with a discharge current of 1 amp in xenon gas at 98 m Torr. Other measurements obtained from this tube are in disagreement with the previous tube. The theory of electron beam scattering is examined and it is found that electron-atom collisions have a larger effect than electron-ion collisions. Mean-free-paths of several centimeters are predicted for beam electrons in a beam-plasma system having 50% ionization and a plasma density of 10 to the 15th power cm to the -3rd power. Results obtained in the plasma tester need re-examination because of the disagreement with the earlier plasma tester. From the theoretical studies it is concluded that highly ionized plasmas are desirable for amplifier applications because of the longer mean-free-paths that exist. Recommendations are made and plans for the forthcoming quarter are outlined. (Author)

AD-427 080 Div. 8, 30
OTS price $7.60

Radiation, Inc., Melbourne, Fla.
INTERFERENCE MONITOR FEASIBILITY STUDY. PHASE III. Final rept.
Sep 63, 68p. Rept. no. 1593 3
Contract AF30 602 2695, Task 454001
RADC TDR63 406 Unclassified report

Descriptors: (*Radiofrequency interference, Monitors), Feasibility studies, Tests, Test facilities, Traveling wave tubes, Oscillographs, Mixers (Electronic), Video amplifiers, Models (Simulations), Very high frequency, Ultrahigh frequency, Super high frequency, Extremely high frequency.

The design of the feasibility breadboard model RFI monitor has been completed and the laboratory test results are presented. An on-site feasibility demonstration was conducted at the Verona Test Site. The recorded results of the field demonstration are presented. Recommendations are made concerning the philosophy, specifications, and implementation of an ultimate RFI monitor. (Author)

AD-427 100 Div. 8
OTS price $3.60

Microwave Associates, Inc., Burlington, Mass.
MAGNETICALLY CONTROLLED GAS DUPLEXER,
by C. S. Ward. Dec 63, 29p.
Contract AF30 602 2960, Proj. 5573, Task 557301
RADC TDR63 500 Unclassified report

Descriptors: (*Transmit-receive tubes, Magnetic fields), Discharge tubes, Electric discharges, Time, Helium, Neon, Argon, Equations, Plasma medium, Wave transmission, Pressure, Radiofrequency power, S-band, Waveguide switches.

Experimental studies have shown that magnetic fields do not produce any significant reduction in discharge arc loss in gas discharge switches for pressures in the millimeter range. The recovery time problem in a magnetic field has been analyzed in terms of microwave transmission through a magnetized plasma slab. Plotted computer results are compared with experimental data. (Author)

AD-427 108 Div. 8, 19
OTS price $13.50

Aero Geo Astro Corp., Alexandria, Va.
SUPERSENSITIVE CRYSTAL VIDEO TRANSPONDER SET AN/DPN-(XE-1).
Quarterly progress rept. no. 1
Oct 63, 1v.
Contract DA36 039AMC03190E
Unclassified report

Descriptors: (*Transponders, Airborne), (*Tunnel diodes, Transponders), Design, C band, Research program administration, Sensitivity, Management engineering, Operations research, Scheduling, Video amplifiers, Bandwidth, Radiofrequency amplifiers, Crystal detectors, Demodulators, Power supplies, Temperature, Primary cells, Navigational aids, Radar navigation, Radar beacons.

This is the first quarterly progress report on an eighteen month research and development program leading to the development of the AN/DPN-(XE-1) Transponder. This C-band transponder is being developed to fulfill the state-of-the-art requirements defined by the Technical Specifications ERDA-EID-012 of the United States Army Electronics Research and Development activity. The AN/DPN-(XE-1) will be a miniature, supersensitive crystal video transponder for operation at C-band with ground based instrumentation type radars. It will be suitable for radar tracking of missiles, drones, and satellites to ranges of 300 miles. (Author)

AD-427 113 Div. 8
OTS price $1.60

ITT Industrial Labs., Fort Wayne, Ind.
RESEARCH AND DEVELOPMENT TO IMPROVE THE

Descriptors: (*Magnetohydrodynamics, Generators), (*Plasma physics, Gas ionization), Gases, Temperature, Pressure, Magnetic fields, Electrical conductance, Electrodes, Thermionic emission, Chromatographic analysis, Helium, Density, Measurement, Power.

One of the primary objectives of this program has been to experimentally demonstrate the principle of magnetically induced non-equilibrium ionization under actual closed-cycle magnetoplasmadynamic generator operating conditions. Data are presented, obtained during recent runs, which are of great scientific value since they experimentally prove for the first time the presence of magnetically induced non-equilibrium ionization. These runs were made with helium gas seeded with cesium under closed-cycle magnetoplasmadynamic generator operating conditions. The gas temperatures during these runs were varied from about 800-870 K, and in each case the effective electrical conductivities measured whenever the magnetic field was on were over two orders of magnitude higher than the gas conductivities which could have possibly been attained by thermal equilibrium ionization alone. (Author)

AD-427 791 Div. 7, 26, 8
OTS price $1.60

Motorola Inc., Phoenix, Ariz.
MINIATURE THIN FILM INDUCTORS (MODIFICATION NO. 2).
Interim rept. no. 2, 1 Sep-1 Dec 63,
by F. R. Gleason. 20 Dec 63, 14p. Rept. no. 4003 2
Contract NObsr85397 Task 9636
Unclassified report

Descriptors: (*Coils, Metal films), (*Metal films, Manufacturing methods), (*Manufacturing methods, Coils), (*Miniature electrical equipment, Coils), Gold, Inductance, Electroplating, Ferrites, Encapsulation, Evaporation, Vacuum, Physical properties, Chromium, Permeability.

This report describes the continued work on fabricating miniature thin-film inductors using flat conducting spirals deposited on ferrite substrates and encapsulated with a ferrite-film deposit. Gold spiral coils of 0.67 and 1.58-microhenry air-core inductance have been fabricated on Ceramag 9 ferrite substrates. These coils were fabricated by electro-plating a gold spiral pattern which was vacuum deposited on the substrate in two steps through two properly oriented masks. The methods used to solve the problems of adjacent turn shorting during electroplating and poor adhesion of the pattern to the substrate are described. Samples of the gold spirals have been encapsulated in ferrite film deposited at 800 C to thicknesses of 150 microns. An inductance increase over air-core value of only four times was obtained, although the permeability of the films has been measured to be seventy or more. The reason for this small inductance increase is not known at this time. Because of the low inductance increase, no Q-value measurements at 1 mc were made. Ferrite films deposited at temperatures of 400 to 700 C were also studied. This investigation was initiated in case it was necessary to deposit ferrite on coils that could not survive the 800 C temperature. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-427 015 Div. 8
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
POWERFUL KLYSTRON AMPLIFIERS,
by V. P. Demidov. 26 Sep 63, 5p.
FTD MT63 91
Unclassified report

Trans. from Vestnik Protivovozdushvoy Oborony, No. 9, pp. 23-25, 1961.

Descriptors: (*Klystrons, Power amplifiers), (*Power amplifiers, Klystrons), Radar receivers, Machine translation, Cavity resonators.

A machine translation is presented of a Russian article on klystron power amplifiers for use in radar receivers. The text was processed by the AN/GSQ-16(XW-2) Machine Translator. (Author)

AD-427 028 Div. 8, 26
OTS price $6.60

General Electric Co., Owensboro, Ky.
DEVELOPMENT OF AN IMPROVED JAN 6299.
Quarterly progress rept. no. 8, 1 July-30 Sep 63. 30 Sep 63, 58p.
Contract DA36 039SC85953
Unclassified report

Descriptors: (*Electron tubes, Manufacturing methods), (*Manufacturing methods, Electron tubes), Seals (Stoppers), Glass, Ceramic materials, Temperature, Cathodes (Electron tubes), Physical properties, Performance (Engineering), Life expectancy, Humidity, Reliability (Electronics), Anodes (Electron tubes), Aging (Materials), Failure (Mechanics), Alternating current, Direct current, Copper, Nickel, Gold, Plating.

The purpose of this contract is to evaluate certain areas of advanced tube manufacturing techniques and apply them where feasible to JAN 6299 to result in a more reliable and better performing tube. The objective requirements for the improved tube are Signal Corps Technical Requirement SCS-90 (Improved JAN 6299) and operation at a tube temperature rating of 225 C. A summary of the status of the following areas is presented: (1) improved alignment, concentricity and ceramic strength; (2) improved anode to ceramic seal; (3) temperature control at exhaust; (4) improved application of cathode coating; (5) improved cathode mounting; (6) improved processing for higher temperature operation; (7) improvement in humidity testing; (8) improved exhaust fixturing; and (9) extended life test and tube failure analysis. The conclusions reached on the failure mechanism during humidity testing are also presented. (Author)

AD-427 058 Div. .8
OTS price $5.60

General Electric Co., Syracuse , N. Y.
FAILURE MECHANISMS AT SURFACES AND INTERFACES.
Interim technical documentary rept. no. 1, 1 July-1 Oct 63,
by K. K. Reinhartz, V. A. Russell, D. L. Stockman, W. J. van der Grinten and W. L. Willis. Dec 63, 45p.
Contract AF30 602 3085, Proj. 5519, Task 551902
RADC TDR63 474 Unclassified report

the reflected, refracted, and lateral wave fields can be constructed from a knowledge of the radiation field in an infinite medium, thereby providing quantitative support for certain ray-tracing procedures when the source is located inside, rather than exterior to, the anisotropic region. In this quasi-optical interpretation, the refractive index surfaces descriptive of plane wave propagation in the medium play a crucial role since they provide information on the directions of: (1) the ray (energy flow) and wave normal (phase propagation) vectors, thereby facilitating the implementation of the radiation condition (2) the incident, reflected, and refracted rays; and (3) the critically refracted rays required to launch the lateral waves. A physical basis has thereby been provided for the quantitative understanding of radiation phenomena which, though derived for uniaxially anisotropic media, may be expected to occur also in other types of anisotropy. (Author)

AD-427 186 Div. 8, 25
OTS price $1.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
DYNAMIC BEHAVIOR OF QUANTUM MECHANICAL OSCILLATORS,
by George Makhov and Ojars Risgin. Dec 63, 16p.
Rept. no. 2900 383T
Contract DA36 039sc78801
Unclassified report

Report on Proj. Michigan.

Descriptors: (*Masers, Microwave oscillators) Microwave amplifiers, Stability, Equations, Microwave equipment, Optical properties, Combat surveillance, Target acquisition, Nonlinear systems, Resonators, Optical equipment.

The time variation of amplitude of a maser oscillator is derived from a study of the rate equations connecting the population inversion and the electromagnetic energy stored in the maser resonator. The methods of nonlinear mechanics are used to derive a qualitative description of the amplitude variation in the absence of a complete solution of the rate equations. Modifications of the simple rate equations necessary to account for the existence of undamped relaxation oscillations are introduced for both microwave and optical masers, and their physical significance is discussed. The production of 'giant pulses' of radiation is also treated. (Author)

AD-427 188 Div. 8
OTS price $1.60

Electromagnetic Technology Corp., Palo Alto, Calif.
FREQUENCY CONVERTER UNITS FOR L-BAND, S-BAND, C-BAND AND X-BAND.
Interim development rept. no. 6, 1-31 Dec 63. 15 Jan 64, 16p.
Contract NObsr89536, Proj. SF0100201, Task 9294
Unclassified report

Descriptors: (*Frequency converters, Microwave frequency), (*Diodes (Semiconductor), Frequency converters), Extremely high frequency, L band, S band, C band, X band, High-pass filters, Band-pass filters, Mixers (Electronic), Crystal rectifiers, Varactor diodes, Waveguide irises, Radiofrequency power, Low-pass filters, Scheduling.

A high-pass filter using smooth tapers instead of multiple step transformers for input and output impedance matching was designed and is being fabricated. A flat iris band-pass filter for the L-band converter was constructed and tested. Another commercial low-pass filter having a 10 Gc cutoff was tested for suitability in these frequency converters. A crystal mount suitable to the needs of the converter was designed and built, and is now being used satisfactorily. Tests were made to determine the power handling capability of a 1N53 crystal at the temperature of dry ice. At 15 mw drive the conversion loss deteriorated 6 db in four hours. A 1N26A crystal at room temperature showed no deterioration in four hours at a drive of 40 mw. The frequency converting properties of varactor diodes were explored in the knowledge that such diodes readily handle relatively large voltages. Preliminary results are quite discouraging, and this approach has been abandoned. (Author)

AD-427 196 Div. 8, 26
OTS price $2.60

Westinghouse Electric Corp., Youngwood, Pa.
500 C SILICON CARBIDE RECTIFIER PROGRAM.
Interim technical progress rept. no. 9, 1 Oct-31 Dec 63,
by H. C. Chang, V. J. Jennings, D. R. Thornburg, L. J. Kroko and J. Ostroski. 31 Dec 63, 17p.
Contract AF33 657 7027, Proj. 7 727
ASD IR 7 727, vol. 9 Unclassified report

Descriptors: (*Crystal rectifiers, Silicon alloys), (*Manufucturing methods, Crystal rectifiers), Carbon alloys, Carbides, Sublimation, Furnaces, Production, Epitaxial growth, Crystal growth.

Efforts were continued on the development of methods for quality-quantity production of SiC rectifiers. A larger diameter sublimation furnace was designed and fabrication will begin shortly. With a larger growth cavity and therefore a greater surface area available for crystal growth, the number of usable crystals per run should increase. Epitaxial layers of containing a p-n junction were prepared and evaluation is in progress. The design of the equipment needed for quantity production of SiC rectifiers is nearly complete. (Author)

AD-427 218 Div. 8, 25
OTS price $5.60

Michigan U., Ann Arbor.
BASIC RESEARCH IN MICROWAVE DEVICES AND QUANTUM ELECTRONICS.
Quarterly progress rept. no. 2, 1 Aug-1 Nov 63,
by H. K. Detweiler, M. E. El-Shandwily, B. Ho, G. Hok and J. E. Rowe. Nov 63, 46p. Rept. no. 05772 2P
Contract NObsr89274, Proj. SR0080301, 05772; Task 9391
Unclassified report

Descriptors: (*Microwave equipment, Theory), (*Millimeter waves, Amplifiers), (*Traveling-wave tubes, Modulation), Pumping (Electronics), Parametric amplifiers, Electromagnetic waves, Ciruits, Electron beams, Dielectrics, Coupling circuits, Equations, Transformations (Mathematics), Cyclotron waves, Cavity resonators, Propagation, Direct current, Frequency multipliers, Feedback, Brazing, Beryllium compounds, Oxides, Helixes, Microwave frequency, Phase modulation, Amplitude modulation, Mathematical models.

Research was continued on the investigation of new ideas in the areas of microwave devices and quantum electronics. A study was made of the generation and amplification of coherent electromagnetic energy in the millimeter and submilli-

RESOLUTION OF IATRON DIRECT VIEW STORAGE TUBES, VOLUME I.
Summary rept. on Phase 1,
by K. R. Crowe. 16 Dec 63, 12p. Serial no. 3295
Contract NObsr87264, Proj. SR00803, Task 9497
Unclassified report

Descriptors: (*Cathode ray tubes, Storage tubes), (*Storage tubes, Resolution), Electrodes, Electron lenses, Manufacturing methods, Electron tube parts, Electric insulation.

Contents: Field Mesh Iatron; Complex Mesh Construction Techniques; Complex Mesh Tube; and Thick Mesh Iatrons.

AD-427 114 Div. 8
OTS price $8.60

ITT Industrial Labs., Fort Wayne, Ind.
RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IATRON DIRECT VIEW STORAGE TUBES, VOLUME II.
Summary rept. on Phase 1, 22 Feb-22 May 62,
by R. H. Clayton. 16 Dec 63, 1v. Serial no. 3295
Contract NObsr87264, Proj. SR00803, Task 9497
Unclassified report

Descriptors: (*Cathode ray tubes, Storage tubes), (*Storage tubes, Resolution), Electron optics, Focusing, Electrostatic fields, Electron lenses, Magnetic fields, Optical scanning, Phosphorescent materials, Collimators, Electron guns, Electric potential, Deflection, Electron tube parts.

The purpose of this research and development is to improve the resolution of Iatron Direct View Storage Tubes. Studies and investigations will be conducted on the electron optical design of the image section to effect resolution improvement according to the following principles: electrostatic 'microlens' principle of focusing each mesh aperture of the storage screen onto the phosphor by its individual lens; magnetic 'microlens' principle of focusing each mesh aperture by its localized magnetic field; and gross magnetic focusing as in storage image tubes but with additional provision for effecting scan. Experimental samples were constructed. A summary of progress to date is given. (Author)

AD-427 117 Div. 8
OTS price $2.60

Tyco, Inc., Waltham, Mass.
STUDY OF SURFACE STATES IN SEMICONDUCTORS,
by G. Rupprecht. Dec 63, 17p.
Contract AF30 602 3157, Proj. 5519, Task 551906
RADC TDR63 464 Unclassified report

Descriptors: (*Semiconductors, Surface properties), (*Surface properties, Semiconductors), Silicon, Germanium, Electrical conductance, Electric fields, Electrons, Fixed contacts, Low temperature research, Vacuum apparatus, Theory.

Research concerns a study of surface states in semiconductors. Apparatus for the pulsed field effect was assembled and tested by reproducing previous experiments on silicon and germanium surfaces. Measurements on n-type silicon indicate surface states with cross-sections of 10 to the -12th power sq cm 0.73 e.V. below the conduction band, near those previously reported at 0.62 e.V. The pulsed field effect experiment on germanium surfaces, however, revealed slow surface states whose decay times increased as adsorbed gases were removed. (Author)

AD-427 155 Div. 8
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
A GENERAL ANALYSIS OF THE FALSE-LOCK PROBLEM ASSOCIATED WITH THE PHASE-LOCK LOOP,
by Walter A. Johnson. 2 Oct 63, 9p. Rept. no. TDR269 4250 45 1
Contract AF04 695 269
SSD TDR63 222 Unclassified report

Descriptors: (*Phase control devices, Mathematical analysis), Phase detectors, Equations, Sidebands, Phase-locked communication systems, Phase measurement, Errors.

An approximate analysis is made of phase-lock loop false locks as determined by the gain-phase characteristics of the phase-lock loop. The solutions presented enable the calculation of the false-lock frequencies if the open-loop phase characteristic is known. A simple design criterion is suggested to permit the design of a loop with no stable locks other than the desired lock frequency. (Author)

AD-427 170 Div. 8, 26
OTS price $2.60

Bomac Div., Varian Associates, Beverly, Mass.
BL-221 70 Gc MAGNETRON PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 8, 6 May-6 Aug 63.
6 Aug 63, 23p.
Contract DA36 039sc85974
Unclassified report

Descriptors: (*Magnetrons, Extremely high frequency), Production, Manufacturing methods, Anodes (Electron tubes), Life expectancy, Tests, Electric potential, Electrolytic polishing, Copper, Cathodes (Electron tubes), Crystal structure.

Storage and operational life tests were performed on previously manufactured tubes with Bomac facility hot hobbed and machined anodes. The satisfactory performance exhibited by these tubes indicates that the new techniques employed in the manufacture and processing of the Bomac facility anodes are adequate. A new hob for cold anode hobbing work was built and successfully tried. Studies on OFHC copper were conducted with the result that the grain size in the material used must be carefully predetermined and controlled in order to produce good mm anodes via cold hobbing. (Author)

AD-427 175 Div. 8
OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
RADIATION FROM A DIRECTIVE ANTENNA EMBEDDED IN AN ANISOTROPIC HALF SPACE,
by L. B. Felsen and B. Rulf. 9 Aug 63, 30p.
Rept. no. RR1183 63; SR1
Contract AF19 628 2357, Proj. 5635
AFCRL 63 512 Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), (*Electromagnetic wave reflections, Anisotropy), Antennas, Antenna lobes, Refractive index, Antenna radiation patterns, Equations, Plasma medium.

Research was directed to the quantitative aspects and physical mechanism of radiation from sources in bounded anisotropic media. An asymptotic evaluation of the rigorous solution has led to far field contributions which have been identified as incident, reflected and refracted waves, and also as lateral waves. It has been shown how

of the L-band low noise DC-pumped tube incorporating a low noise beam from a cathode immersed in a high magnetic field has been completed and two tubes constructed. Measurements on the tubes are discussed. (Author)

AD-427 307 Div. 8
OTS price $5.60

Smith, E. H., and Co. Inc., Silver Spring, Md.
THEORETICAL RESULTS FOR SHIPBOARD ANTENNAS.
Dec 62, 1v.
Contract N178 8090
Unclassified report

Descriptors: (*Ship antennas, Theory), Dipole antennas, Diffraction, Mathematical analysis, Electromagnetic fields, Electric fields, Antenna radiation patterns, Ship decks, Bessel functions.

AD-427 315 Div. 8, 25, 5
OTS price $13.00

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
(No title).
Progress rept. no. 24, 1 Apr-30 Sep 63,
by Ernst Weber. 30 Sep 63, 170p. Rept. no. R 452 24 63
Grant AF AFOSR453 63; Proj. 4751
Unclassified report

Descriptors: (*Reviews, Research program administration), (*Reports, Abstracts), (*Microwaves, Scientific research), Electromagnetic waves, Plasma physics, Magnetohydrodynamics, Solid state physics, Materials, Microwave communication systems, Networks, Theory, Communication systems, Control systems, Symposia, Scientific personnel.

AD-427 347 Div. 8
OTS price $7.60

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
ENHANCED MICRO-MODULE INTERCONNECTION. AN HERMETIC PACKAGING SYSTEM FOR THE INTEGRATION OF MICRO CIRCUITS.
Quarterly rept. no. 1, 12 June-30 Sep 63,
by G. F. Lang and D. J. Garibotti. 4 Jan 63, 1v. Rept. no. SCL7686
Contract DA36 039AMC03620E
Unclassified report

Descriptors: (*Integrated circuits, Packaged circuits), (*Packaged circuits, Integrated circuits), Microminiaturization (Electronics), Production, Manufacturing methods, Electron beams, Welding, Vacuum apparatus, Vaporplating, Bonding, Electric connectors.

The Enhanced Micro-Module - EMM - is an all electron beam welded, hermetically sealed interconnection - packaging system which is compatible with all approaches to microminiaturization. Each module comprises up to ten stacked microwafers .310 x .310 inches on a side which are interconnected by 36 electron beam welded conductor ribbons. Communication with external circuitry is achieved through a hermetic header which is electron beam welded to the can. The high interconnection capability of the system is uniquely suited for packaging of uncased active devices and semiconductor circuits. Program 'Enhanced Micro-Module Interconnections (A Hermetic Packaging System For The Integration of Micro-Circuits)' has been subdivided into the following phases: (1) Preproduction effort, (2) Tooling, and (3) Pilot line and production run. Specifically, considerable effort has been directed toward the definition of materials and selection of processes compatible with production environments. Previously developed laboratory techniques have been under evaluation for potential extrapolation into manufacturing steps. (Author)

AD-427 397 Div. 8
OTS price $9.60

RCA Victor Co., Ltd. (Canada).
ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF THE PRESENCE OF IONIZED MEDIA ON ANTENNA PROPERTIES.
Final rept.,
by M. P. Bachynski. Oct 63, 115p.
Contract AF19 604 7334, Proj. 4642, Task 464201
AFCRL 63 541 Unclassified report

Descriptors: (*Antennas, Ion bombardment), Experimental data, Microwave equipment, Horn antennas, Plasma sheath, Dielectric properties, X-band, Antenna radiation patterns, Radio signals, Mathematical models, Analysis.

The following research programme was performed. An experimental investigation of the behaviour of a microwave horn antenna in the presence of a plasma sheath generated in helium, was conducted at a frequency of 9.7Gc (x-band). A comprehensive series of investigations designed to test the validity of various theoretical treatments of plasma properties and to assess the accuracy of various microwave systems for determining the properties of plasmas which are finite in extent using free-space microwave techniques were performed. Theoretical results were obtained for prediction of plasma effects such as plasma boundaries, refractive defocussing, non-uniformity of plasma and diffraction due to finite size of the plasma. Preliminary considerations were given to the investigation of antenna properties in the presence of a plasma sheath which is anisotropic due to the presence of a static magnetic field. A magnetic field apparatus suitable for such investigations and capable of generating magnetic field strengths in excess of 4500 gauss with a working diameter of 7 in. was assembled and tested. (Author)

AD-427 547 Div. 8
OTS price $1.10

Microwave Electronics Corp., Palo Alto, Calif.
DEVELOPMENT OF LOW NOISE TRAVELING-WAVE TUBES PHASE III: ENVIRONMENTALIZATION.
Monthly status letter no. 23, 1 Dec 63-2 Jan 64,
by A. C. Ashley and W. E. Raub. 2 Jan 64, 6p.
Contract NObsr81227, Proj. SS021001
Unclassified report

Descriptors: (*Traveling wave tubes, X-band), Life expectancy, S band, C band, L band, Environmental tests, Temperature, Shock (Mechanics), Vibration, Gain.

The X-band life test tube has passed 2,300 hours of operation with only slight degradation of performance, while two S-band tubes have passed 700 hours with virtually no change of performance. One C-band tube was being environmentally tested at the end of the reporting period. This tube will be on life test during the next period. One L-band vacuum envelope of the 300-volt helix design was partially tested during the period, but it developed a grid 2-to-grid 3 short before any significant data could be obtained. (Author)

AD-427 609 Div. 8
OTS price $2.60

Radio Corp. of America, Moorestown, N. J.
AN L-BAND TUNNEL DIODE OSCILLATOR.

meter wavelength region. The analysis of amplitude and phase modulated traveling-wave amplifiers continued. The equation for the output field of a traveling-wave amplifier with a finite number of input frequencies is derived. Experimental results with a two-frequency input are given. A state-of-the-art survey of the literature concerning a DC pumped quadrupole amplifier is given. (Author)

AD-427 251 Div. 8
OTS price $1.60

Illinois U. Engineering Experiment Station, Urbana.
INVESTIGATION OF THE LOG-PERIODIC COAXIAL FED MONOPOLE ARRAY,
by Fred R. Ore. Oct 63, 17p. Technical note no. 1
Contract NObsr85243; Proj. SS024001
Unclassified report

Descriptors: (*Antenna configurations, Models (Simulations), Polarization, Antenna feeds, Coaxial cables, Electrical impedance, Antenna radiation patterns, Standing wave ratios, Radio equipment.

A description is given and results are presented of a limited scale model experimental investigation of a unidirectional, vertically polarized log-periodic antenna. This type of structure is called the coaxial-fed monopole array. This structure is of interest due to the fact that it exhibits the general characteristics thought to be necessary for a basic element of the Wide Aperature Radio Location Array (WARLA). The investigation was principally directed toward finding a structure having a particular radiation pattern, after which this particular structure was investigated in detail to ascertain and optimize its impedance performance. (Author)

AD-427 256 Div. 8, 5
OTS price $1.60

Naval Research Lab., Washington, D. C.
INVESTIGATION OF A VOLTAGE TUNABLE FILTER FOR P-BAND COMMUNICATION RECEIVERS,
by H. E. Brown, H. D. Arnett and S. T. Smith. 16 Dec 63, 10p.
NRL 6022 Unclassified report

Descriptors: (*Backward wave tubes, Band-pass filters), (*Band-pass filters, Backward wave tubes), P-band, Very high frequency, Ultrahigh frequency, Radio receivers, Backward-wave amplifiers, Radio interference, Gain, Attenuation, Tuned circuits, Electric potential, Bandwidth, Communication equipment, Electron guns, Low-pass filters, Impedance matching.

An experimental study is described of a backward-wave tube for use with communication receivers over that part of P-band from 225 to 400 Mc. Such receivers, particularly those which must operate in an environment of strong adjacent signals, need an increased degree of discrimination against these spurious signals. Since the backward-wave amplifier is inherently a very narrow bandwidth filter, its use in this application is apparent. A backward-wave oscillator was operated just below the threshold of oscillation as a high-gain amplifier over the frequency range 270 to 432 Mc. This gave a maximum "electronic" gain of 30 db; however, the overall gain of the device was unity, with the major portion of the loss occurring in the input and output couplers. The off-frequency signal attenuation capabilities were found to be 20 db over a bandwidth of 4 Mc at 330 Mc and 6 Mc at 400 Mc. These measurements were made with a power output of the device in the neighborhood of 50 db below 1 mw. Other characteristics of the tube such as oscillation starting current, large signal behavior, and cross modulation were studied briefly, with major emphasis being put on frequency rejection characteristics. While rapid electronic tuning would not be feasible with this tube. (Author)

AD-427 258 Div. 8
OTS price $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DELAY IN DATA TRANSMISSION THROUGH GENERAL NETWORKS,
by B. J. Moriarty. 18 Dec 63, 54p. Rept. no. 65G7
Contract AF19 628 500
ESD TDR63 597 Unclassified report

Descriptors: (*Data transmission systems, Optimization), (*Radio teletype systems, Time), Errors, Networks, Redundant components, Effectiveness, High frequency, Guided missile ranges, Theory, Simulation, Corrections, Detection.

Delays are studied which are due to link outages experienced in sending data through a communication network. Error-correcting techniques ensure that all data are effectively transmitted without error through a link, but delayed when the link is not functioning correctly. One source of data and one link for data is assumed. A data handling logic is adopted at the nodes which permits the use of all links (if desired) in a network. The use of redundant links to reduce delay was investigated by means of a computer simulation program. The link behavior assumed for this program is that obtained from measurements of two HF RTTY links. Theoretical approximations for delay are obtained which indicate the importance of the minimum cut set and minimum path length. Simulation results are in close accord with these approximations. (Author)

AD-427 300 Div. 8
OTS price $1.60

Zenith Radio Corp., Chicago, Ill.
DEVELOPMENT OF A HIGH FREQUENCY ELECTRON-BEAM PARAMETRIC AMPLIFIER.
Quarterly progress rept. no. 9, 1 Jul-30 Sep 63, by Peter G. Everett and Roy A. Larsen. 30 Sep 63, 24p.
Contract DA36 039sc88915, Task IG6 22001A055 04
Unclassified report

Descriptors: (*Parametric amplifiers, X band), (*X band, Parametric amplifiers), Traveling wave tubes, Magnetic fields, Pumping (Electronics), L band, Noise (Radar), Gain, Electron beams, Cathodes (Electron tubes), Physical properties, Performance (Engineering), Temperature.

In a tube rebuilt with a 0.010-in. diameter cathode, the fast cyclotron wave excess temperature at the output coupler with the input coupler matched was 570 deg. K. The measurement was made with the 8 db noise figure radiometer system because of difficulty encountered with the pump circuit of the degenerate parametric amplifier under construction. A more precise measurement will be made on completion of the reactance amplifier but it is considered that the above temperature precludes any use of such beams in low noise amplifiers. Results of an analysis of slow cyclotron wave traveling wave tubes are presented. The conclusion reached is that low temperature cyclotron waves produced by high cathode magnetic fields are not likely to be useful in traveling wave tubes except perhaps at signal frequencies below 1000 Mc. Design

alumunum evaporation are being pursued as alternative processes for fabricating the devices. Step-stress testing with power dissipation as the stress has been almost completely evaluated as a convenient monitor to verify reliability improvements to be expected from the Equipment and Process Improvements. (Author)

AD-427 720 Div. 8
OTS price $13.50

Technical Research Group, Menlo Park, Calif.
AN INVESTIGATION OF THE HF WIRE-GRID LENS ANTENNA FOR DIRECTION FINDING.
Final technical documentary rept.,
by R. L. Tanner, M. G. Andreasen, E. D. Sharp and J. C. Greene. Dec 63, 1v.
Contract AF30 602 2742, Proj. 4505, Task 450502
RADC TDR63 211 Unclassified report

Descriptors: (*Lens antennas, Direction finding), High frequency, Refractive index, Transmission lines, Antenna radiation patterns, Antenna feeds, Radio navigation, Mathematical analysis, Electromagnetic fields.

The theoretical investigation of the HF Wire-Grid Lens Antenna for use as an HF direction-finding antenna is reported. An electromagnetic solution of the radiation characteristics of the HF Wire Grid Lens Antenna is outlined. This solution yields accurate radiation patterns for lenses having any diameter-to-wavelength ratio. The solution also includes the effect on the radiation pattern of the flared horn surrounding an actual wire-grid lens, both for the case when the horn surfaces are constructed of isotropic metal conductors, and for the case where the horn surfaces are constructed from radial wires. The validity of the lens solution has been tested against results obtained for the special case of a Luneburg Lens. (Author)

AD-427 731 Div. 8
OTS price $4.60

Digital Computer Lab., U. of Illinois, Urbana.
TUNNEL DIODE CIRCUITS COUPLED INTO TRANSMISSION LINES,
by Tohru Moto-Oka. 16 Aug 63, 43p. Rept. no. 155
Contract Nonr1834 15
Unclassified report

Descriptors: (*Tunnel Diodes, Transmission lines), (*Transmission lines, Tunnel Diodes), Equations, Radiofrequency amplifiers, Gain, Mathematical Prediction, Radiofrequency oscillators, Impedance matching.

All interconnecting wires should be considered as transmission lines in very high speed circuitry. Consideration is given to two groups of methods which are used in the design of very high speed tunnel diode switching and logic circuits. In the first method it is assumed that all constants are ideal lumped constants and that they are interconnected ideally at first. They are then replaced by distributed circuitry. In the second method tunnel diodes are connected to distributed circuitry from the beginning. In the latter method it may be possible to discover the circuitry in which the characteristic of the distributed circuit is used in our favor. It is impossible to derive this type of circuit from the lumped constant circuit. The character of the tunnel diode circuits coupled into distributed circuits is not understood well enough to design very high speed switching and logic circuits. In this report, typical tunnel diode circuits coupled into transmission lines are investigated as the preparatory stage of latter design methods. Amplifiers, oscillators and switching circuits are considered. (Author)

AD-427 732 Div. 8
OTS price $9.60

Microwave Research Inst., Polytechic Inst., of Brooklyn, N. Y.
HIGH POWER MICROWAVE ELECTRONICS.
Final rept.,
by John W. E. Griemsmann. 15 Aug 63, 1v.
Rept. no. 1191 63
Contract AF30 602 2135
RADC TDR63 454 Unclassified report

Descriptors: (*Resonators, Microwave equipment), (*Waveguide switches, C Band), (*Microwave equipment, Test facilities), X band, Metals, Aluminum, Stainless steel, Electrical conductance, Magnetrons, Circuits, Electric potential, Phase modulation, Keystrons, Test facilities, Tests, Test equipment, Nylon, Microwave frequency, Dielectrics, Microwave amplifiers, Waveguides, Thyratons, Radiofrequency pulses, Traveling wave tubes, Electronic switches, Gas discharges.

This report covers: (a) the present status of the high-power microwave facility at the Long Island Graduate Center, Farmingdale, New York; (b) analysis, design and experimental work connected with a proposed C-band dischargeable traveling wave resonator (TWF), using oversized, low-loss, multimode waveguide and capable of magnifying appreciably the peak powers currently available in high-power pulsed microwave sources for delivery in the form of intensified but narrower pulses to an external load; and (c) interaction of high microwave powers and fields with dielectric and metallic materials. The development of two different broadband, gaseous discharge type, C-band high-power microwave switches motivated by the switching requirements of the TWF, is reported. These have very low (<0.2 db) insertion loss, high switching speed (30 and 10 nanoseconds, respectively) and are capable of handling peak powers in excess of one megawatt. One device is a low-pressure hydrogen gas wave guide thyratron and the other a dc-triggered, microwave spark gap operating in air at atmospheric or higher pressure. (Author)

AD-427 756 Div. 8, 25
OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AVERAGE SCATTERING CROSS SECTION OF RANDOMLY-ORIENTED DIPOLES,
by M. Check and B. Reiffen. 30 Dec 63, 16p.
Rept. no. GR65G 8
Contract AF19 628 500
BSD TDR63 665 Unclassified report

Descriptors: (*Dipole antennas, Electromagnetic fields), (*Radar echo areas, Scattering), Monte Carlo method, Polarization, Propagation, Numerical analysis, Power, Generators.

The bistatic cross section of resonant half-wave and full-wave resonant dipoles is considered. The cross section is calculated for various combinations of polarization of transmitting and receiving antennas both linear and circular. The calculation is accomplished by a Monte Carlo method which is estimated to be accurate within several percent. The calculated values for backscattering are seen to agree with certain results in the literature. (Author)

AD-427 760 Div. 8
OTS price $2.60

Washington U., Seattle, Coll. of Engineering.
(No title).
Final rept., 15 Mar 58-14 Mar 63,

Quarterly progress rept. no. 5, 1 June-31 Aug 63, by D. E. Nelson, R. Gold and E. T. Casterline. 31 Dec 63, 25p.
Contract DA36 039SC90773; Proj. 3A99 21 002
Unclassified report

Descriptors: (*Microwave oscillators, Tunnel diodes), (*Tunnel diodes, Microwave oscillators), L-band, S-band, Radiosondes, Radiofrequency power, Voltage regulators, Transistors, Power supplies, Crystal structure, Gallium alloys, Arsenic alloys, Resistors.

A study was made of the effect of diode peak current on diode speed index and cutoff frequency. The effect of different crystalline planes on diode current density (hence high frequency capability) was also investigated. A simple transistor regulator for tunnel-diode oscillators was devised. This regulator reduced the frequency variation, due to a ± 10% variation in bias voltage, from over 100 mcs to less than 4 mc. Two tunable tunnel-diode oscillators were tested which gave minimum power outputs of 19 and 22 mw respectively over the required 1660 to 1700 mc tuning ranges. Both incorporated transistor regulators and easily met the required ± 2 mc maximum frequency variation for a ± 10% change in bias voltage. One oscillator was delivered as a prototype model and the second is ready for delivery. (Author)

AD-427 612 Div. 8, 16
OTS price $13.50

Midwest Research Inst., Kansas City, Mo.
SURVEY OF RADIO FREQUENCY RADIATION HAZARDS.
Summary rept., 20 May 59-19 May 60,
by Paul C. Constant, Jr., William H. Ashley, Jr., Burton R. Baldwin, E. J. Martin, Jr. and Robert F. Rice. 14 June 60, 191p.
Contract NObs77142; Proj. 2307E
Unclassified report

Descriptors: (*Radiofrequency, Radiation hazards), (*Radiation hazards, Radiofrequency), Tolerances (Mechanical), Safety, Measuring devices (Electrical & electronic), Measurement, Propagation, Symposia, Bibliographies, X band, Instrumentation, Shipborne, Tests, Vector analysis, Microwaves.

This report summarizes the Radiation Hazards (RAD HAZ) program, which involves obtaining and analyzing data and information to provide a basis for formulating RAD HAZ standards. Activities have included a review of the requirements of the program, an investigation of problems involved in radiation hazards, and investigations of the fundamental phenomena of RF propagation. Specific emphases have been placed upon RF measuring instrumentation and upon terminology. (Author)

AD-427 613 Div. 8
OTS price $1.60

Microwave Associates Inc., Burlington, Mass.
SOLID-STATE RF GENERATOR.
Quarterly progress rept. no. 2, 1 Sep-30 Nov 63, by F. P. Collins and C. J. Beanland. 30 Nov 63, 8p.
Contract NObsr89356; Proj. no. SR008 03 01; Task 9391
Unclassified report

Descriptors: (*Radiofrequency generators, Semiconductor devices), Transistor amplifiers, Radiofrequency amplifiers, Power amplifiers, Radiofrequency oscillators, Very high frequency, Transistors.

The performance of the circuits described in this report represents a significant improvement over the original proposals. The achievement of over 20 watts output with only two transistors in the output stage is a major success. In fact, by selecting transistors for high breakdown voltage, it was possible to obtain over 25 watts output with a 60 volt supply. At these high power levels, the thermal design of the equipment, and in particular the transistor heat sinks, is important. This problem is best solved by using transistors which have the crystal electrically insulated but thermally bonded to the transistor case. This is true of the 2N2887 transistors used in the final stage and also of the 2N2950, used in the driver stage. The availability of the latter transistor has greatly simplified the overall driver design compared with the original proposals. (Author)

AD-427 665 Div. 8, 25
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
MINIMUM LENGTH MHD ACCELERATOR WITH CONSTANT ENTHALPY AND MAGNETIC FIELD,
by Harold Mirels, Richard R. Gold and James F. Mullen. 29 Nov 63, 12p. Rept. no. TDR269 4230 10 5
Contract AF04 695 269
SSD TDR63 338 Unclassified report

Descriptors: (*Magnetohydrodynamics, Instrumentation), Calculus of variations, Numerical analysis, Enthalpy, Magnetic fields, Electrical conductance, Measurement.

A closed form solution is obtained for the minimum length of a crossed field MHD accelerator with specified entrance and exit conditions. It is assumed that the enthalpy, magnetic field, and electrical conductivity are constant. The solution is valid when the joule heating, per unit volume, is small compared with the net local electrical power input. (Author)

AD-427 668 Div. 8, 26
OTS price $3.60

National Semiconductor Corp., Danbury, Conn.
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N328A TRANSISTOR.
Quarterly progress rept. no. 1, 30 June-30 Sep 63,
by R. R. Rau and E. N. Clarke. 30 Sep 63, 29p.
Contract DA36 039AMC01480E
Unclassified report

Descriptors: (*Transistors, Silicon), (*Manufacturing methods, Transistors), Production, Scheduling, Management engineering, Reliability (Electronics), Quality control, Vapor plating, Aluminum, Gas analysis, Oxygen, Welding, Vacuum furnaces, Life expectancy.

Efforts are reported on the work performed on improving the reliability of a PNP Silicon Alloy Transistor Type 2N328A. The PERT scheduling of the contract is reviewed and indicates that the work is on, or ahead, of schedule with only one exception, and this latter should cause no delay in contract performance. The etch wheel is already in fabrication; it will be installed in conjunction with larger furnace capacity and more dry boxes and testing stations. The recirculator has already been installed and its evaluation will be completed in the early part of the second quarter. An oxygen analyzer will be incorporated as part of the line at about the same time. Preliminary evaluations of a can welding shield give indications of improvements to be expected for this type of activity. Various methods of

AD-427 847 Div. 8, 6
OTS price $8.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
IMPROVED MICROWAVE PHASE MEASUREMENT TECHNIQUES,
by Lloyb W. Root, Jr. 28 June 63, 75p.
Proj. 1B222901A204
AMC RA RE TR63 35 Unclassified report

Descriptors: (*Phase measurement, Microwaves), Phase detectors, Phase Phase shifters, Hydraulic systems, Broadband, Radar antennas, Stability, Circuits, Power dividers, Continuous wave radar, Test equipment (Electronics), Test methods, Mechanical drawings, Recording systems.

Phase stability is discussed showing the need for improved microwave phase measurement techniques. The state of the art of microwave phase measurements is reviewed and all known measurement techniques are discussed. The development of a precision microwave coax moving short is discussed and experimentally evaluated. Phase detector techniques are discussed and evaluated. Conclusions include best types of phase measurements for field, factory, and laboratory. (Author)

AD-427 859 Div. 8
OTS price $4.60

Georgia Inst. of Tech., Engineering Experiment Station, Atlanta.
RADIO FREQUENCY COMPATIBILITY (RFC) ACCESSORY EQUIPMENT SET.
Quarterly rept. no. 2, 15 July-15 Oct 63,
by H. W. Denny and J. R. Walsh, Jr. 15 Oct 63, 38p.
Contract DA36 039AMC02223E, Proj. A693; 1G620501 D449
Unclassified report

Descriptors: (*Radio interference, Transmission lines), (*Waveguides, Radio interference), Signal generators, Compatibility, Test equipment (Electronics), Measurement, Coaxial cables, Radio communication systems, Filters (Electromagnetic wave), Semiconducting films, Radiofrequency amplifiers, Transformers, Radio receivers, Radio transmitters, Band-pass filters, Circuits.

A study was made leading to a design plan for accessory equipment to be used with radio interference measuring sets and signal generators. The frequency range of interest is 0.014 to 40,000 Mc. Two items of equipment were investigated: a receiver input coupler and an audio susceptibility tester. Consolidation of as many of the various test setups for performing the various measurements into as few basic setups as possible is considered. Some differences applying to waveguide systems are noted. Work on a thin dummy load in a coaxial configuration was started. A taper section for this load was electroformed. Work on the audio susceptibility tester continued with consideration given to both the amplifier and transformer. A receiver input coupler was constructed and preliminary results are shown. A discussion of the various techniques presented in the literature for the measurement of spurious and harmonic emissions in waveguide systems is presented. A method for determining the maximum VSWR that can be expected from the connection of a group of components with given VSWR's is described. (Author)

AD-427 867 Div. 8, 6
OTS price $4.60

General Electric Co., Syracuse, N. Y.
TUNNEL DIODES FOR PHASED ARRAY RADAR.
Quarterly progress rept. no. 2, 10 Oct 63-20 Jan 64.
20 Jan 64, 45p.
Contract NObsr98328, Proj. SR0080301, Task 9349
Unclassified report

Descriptors: (*Tunnel diodes, Radar equipment), (*Microwave amplifiers, Tunnel diodes), Chemical milling, S band, Germanium, Gallium alloys, Antimony alloys, Containers, Noise (Radio), Sandwich construction, Resistors, Stabilization, Glass, Stability, Gain, Admittance, Waveguide circulators, Tuned amplifiers.

Research was continued on the development of tunnel diodes for use in phased array radars. This includes device work for both germanium and gallium antimonide, resistance package, high frequency measurement, low frequency noise measurement and S-Band amplifier. Work was carried out to determine the noise characteristics of germanium tunnel diodes. Data were taken on approximately two hundred germanium diodes to determine the effect of diode parameters on the noise figure index. Considerable work was done in the area of gallium antimonide sandwich pellet fabrication. Various lapping and etching treatment on the GaSb wafer and different kinds of glass were tried without any positive results. High frequency measurements were made on the stabilizing resistance packages. After these measurements, tunnel diode junctions were formed on the packages and high frequency measurements were again made. Then the shunt resistors were removed and measurements were made once more in order to compare the results of the direct and indirect measurement methods. Low frequency tunnel diode shot noise was measured for three germanium diodes. A S-band amplifier was constructed and tested. The stability, gain, tuning range and interchangeability of diodes were found to be excellent. However, the contact mechanisms of the stabilizing resistor and short stubs were not good enough to avoid contact noise. A new amplifier will be built with an improved contact mechanism. (Author)

AD-427 881 Div. 8
OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
CANONICAL FORMS FOR ERROR PROBABILITIES IN BINARY BAYES DETECTION,
by David Middleton. Nov 63, 32p.
Proj. 5628
AFCRL 63 561 Unclassified report

Descriptors: (*Communication theory, Detection), Noise, Signals, Probability, Narrow band, Background, Signal-to-noise ratio.

Canonical relations are obtained for the error probabilities and distribution densities of optimum binary detectors in the 'composite' situation involving detection in noise of signals of one general class (S1) vs signals of another general class (S2). These canonical relations are expressed by appropriate distribution densities of the associated 'on-off' cases S1+N vs N, and S2+N vs N, by which it is then often possible to carry out explicit and exact evaluations for the error probabilities in the corresponding 'composite' cases where a direct approach fails or is extremely difficult. The results are general and apply for continuous as well as discrete sampling, for nonnormal, nonadditive, and nonstationary noise processes, as well as for more familiar normal, additive, and stationary cases. Specific use of these canonical relations is illustrated by several examples. (Author)

by Akira Ishimaru. Mar 63, 23p. TR81
Contract AF19 604 4098; Proj. 5635; Task 563503
AFCRL 63 509 Unclassified report

Descriptors: (*Antennas, Reports), (*Antenna radiation patterns, Synthesis), Antenna configuration, Electromagnetism, Diffraction, Scattering, Antennas, Scanning, Curved profiles, Anisotropy.

Brief descriptions of the research effort are given in the following areas: Antenna pattern synthesis, Modulated antennas, Frequency scanning antennas, Currents on a curved surface, Periodic structures, and Anisotropic media.

AD-427 794 Div. 8, 26
OTS price $4.60

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES.
Quarterly progress rept. no. 5, 14 May-14 Aug 63,
by W. J. Noroski. 14 Aug 63, 37p.
Contract DA36 039sc86731
Unclassified report

Descriptors: (*Cathode ray tubes, Manufacturing methods), Deflection, Electrodes, Production, Electrostatic fields, Vacuum apparatus, Ceramic materials, Metal coatings, Vapor plating.

Efforts were continued on the establishment of a PEM for Deflectron devices. The Deflectron performs the function normally assigned to the two sets of deflection plates standard to electrostatically deflected cathode ray tubes. Equipment for fabrication of evaporation masters is complete and in use. Techniques were firmly established. Vacuum metallization equipment was installed. Ceramic parts for the CY1.1-33 degree are on hand. (Author)

AD-427 800 Div. 8
OTS price $3.60

Mictron Inc., Albany, N. Y.
C.W. X-BAND VOLTAGE TUNABLE OSCILLATOR.
Quarterly progress rept. no. 1, 1 July-30 Sep 63,
by M. R. Boyd and M. Weinstein. 30 Sep 63, 30p.
Contract DA36 039AMC03270E, Task 1G6 22001A055 04
Unclassified report

Descriptors: (*Microwave oscillators, X band), (*X band, Microwave oscillators), (*Tuning devices, Electric potential), (*Manufacturing methods, Production), Jigs, Magnetrons, Power, Frequency, Resonance, Cavity resonators, Ceramic materials, Magnets, Waveguides, Anodes (Electron tubes).

An investigation of a C.W. X-band voltage tunable oscillator has been conducted in accordance with Electronics Command Technical Requirement Number SCL-7001/86. Parts, jigs and fixtures have been ordered. Experimental work has begun with the construction of tubes and their testing at lower frequencies. (Author)

AD-427 819 Div. 8, 26
OTS price $5.60

Watkins-Johnson Co., Palo Alto, Calif.
DEVELOPMENT OF AN E-BAND AMPLIFIER,
by E. W. Kinaman. Nov 63, 44p.
Contract AF30 602 2422, Proj. 5573, Task 55011
RADC TDR63 505 Unclassified report

Descriptors: (*Traveling wave tubes, Microwave amplifiers), (*Microwave amplifiers, Traveling wave tubes), Extremely high frequency, Yttrium, Iron, Garnet, Gain, Signal-to-noise ratio, Electron guns, Filters (Electromagnetic wave), Noise (Radio), Helixes, Waveguides, Cathodes (Electron tubes), Magnets, Bandwidth, Resonance, Anodes (Electron tubes).

This report describes the research and development toward establishing the feasibility of building a low-noise tunable amplifier equipment for E-band. The approach describes development of a traveling-wave amplifier and a yttrium-iron-garnet filter for tandem operation. In the R & D phase the major subassembly problems were solved and measurements made of 5-db tube gain and 1.6-db filter loss near 80 Gc. In subsequent work, tubes with 13-16 db noise figure and gain of 20 ± 5 from 69-96 Gc have been evaluated, substantiating in general the feasibility of the contract objectives. (Author)

AD-427 824 Div. 8
OTS price $3.60

Radio Corp. of America, Lancaster, Pa.
APPLIED RESEARCH ON HIGH RESOLUTION CAMERA TUBES.
Interim technical documentary rept. no. 5, 1 Sep-31 Dec 63,
by B. H. Vine, A. A. Rotow and O. H. Schade, Sr.
17 Jan 64, 28p.
Contract AF33 657 7939
Unclassified report

Descriptors: (*Camera tubes, Resolution), Image tubes, Electron guns, Electron beams, Cathodes (Electron tubes), Electron tube parts, Image intensifiers (Electronics), Cathode ray tube screens, Photoelectric materials, Signal-to-noise ratio, Images, Electromagnetic lenses, Electrostatic fields, Electromagnetic fields, Deflection coils, Electron multipliers, Test equipment, Distortion, Sensitivity.

This work is in part a continuation of research performed on positive-grid electron guns. The new effort which has been undertaken at this time is concerned with cathode, electron gun and electron beam problems; and with the development of a system for cycled operation of a camera tube of the image orthicon type. It is also a continuation of work in developing a target structure consistent with the requirements for a high sensitivity camera tube capable of 1500 television lines per inch at 50 percent sine-wave response over a 2 in. x 2 in. format. During this report period nine (9) 4-1/2 in. tubes were built and tested. The work at RCA Harrison was directed towards investigating the resolution obtainable in a 50 x 50 mm target area. (Author)

AD-427 842 Div. 8
OTS price $4.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
DEVELOPMENT OF RADOME CW-424/FPS-26,
by Charles S. Beal. Dec 63, 43p.
RADC TDR63 481 Unclassified report

Report on 416L System.

Descriptors: (*Radomes, C band), Tests, Tables, Data, Mechanical properties, Electrical properties, Sandwich construction, Panels (Structural), Structural properties, Polyester plastics, Glass textiles, Honeycomb cores, Moistureproofing, Polyethylene plastics.

The development, design, and test of Radome CW-424/FPS-26 are presented. The structural and electrical parameters are first discussed from a theoretical and practical approach. By judicious consideration of the above factors, an optimum rigid C-band radome was attained and the design computations were greatly abbreviated. (Author)

9. FLUID MECHANICS

AD-427 002 Div. 9, 31
OTS price $18.50

Autonetics, Downey, Calif.
HYDROFOIL CONTROL STUDY FOR BUREAU OF SHIPS.
Final rept.,
by R. Olshausen, E. C. Bridges and J. G. Krol.
1 June 62, 1v. Rept. no. EM0362 211
Contract NObs84394
Unclassified report

Descriptors: (*Hydrofoil boats, Control systems), (*Hydrofoils, Ships), Design, Feasibility studies, Models (Simulators), Analog computers, Water waves, Height finding, Radar equipment, Sonar equipment, Automatic pilots, Stabilization, Pitch, Roll, Altitude indicators, Display systems, Hydrodynamics, Reliability, Mounting brackets, Elevators, Ailerons, Flaps, Performance engineering, Mathematical prediction, Ocean waves, Acceleration.

The results of a hydrofoil control study program on 110-ton craft are documented and scale factors are given for converting the results to 300-ton craft. Analytical studies were performed of the hydrofoil auto-pilot control systems longitudinal and lateral plane stability and response characteristics. Analog computer simulations were performed, which included all the significant system nonlinearities, to determine the hydrofoil crafts response to various sea states (sea state 5 maximum) in the longitudinal plane, the lateral plane, and with both planes coupled (six degrees of freedom). Various methods of measuring craft height above the water were investigated. A recommended mechanization of the complete control system is given that stresses high reliability with fail-safe operational capability. (Author)

AD-427 082 Div. 9, 1
OTS price $4.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
THEORY OF LIQUID ABLATION,
by B. Steverding. 22 Oct 63, 43p.
Proj. 1A010501B01013
AMC RA RR TR63 24 Unclassified report

Descriptors: (*Ablation, Liquids), (*Liquids, Ablation), Surface properties, Surface temperatures, Theory, Aerodynamic heating, Films, Surface tension, Effectiveness, Materials, Fluid flow, Glass, Stagnation point.

The consideration of surface phenomena in ablation processes leads to several substantial additions and corrections in the present ''classic'' theory of liquid ablation. The phenomenon of aerodynamic spattering in the ablation of liquid films is closely related to the surface tension. Spattering will not always decrease the ablation efficiency. With ''ideal'' spattering this efficiency may even be increased. Ideal spattering, however, can only occur when a certain combination of material parameters has a distinct value for a given flow condition. A consequent pursuit of this concept will evolve in a quite different aspect of liquid ablation performance. A mechanism for preferential ablation is described and calculated for the simple case where loss by evaporation is large, compared with the loss by flow. The efficiency of liquid ablation can be increased by surface activity. The degree of improvement depends upon the parameter k/Dn and the activity coefficient of the surface-active compound in the liquid glass. The analysis is carried out in the vicinity of the stagnation point of a blunt body for glassy ablation materials. (Author)

AD-427 083 Div. 9
OTS price $1.60

Hawaii Inst. of Geophysics, Honolulu.
INVESTIGATIONS OF TSUNAMI HYDRODYNAMICS.
Annual rept. no. 1, 1962-1963,
by Doak C. Cox. Oct 63, 15p. Rept. no. 43
Contract Nonr374803
Unclassified report

Descriptors: (*Ocean waves, Hydrodynamics), Hydraulic models, Tides, Mathematical analysis.

Contents: Generation problems; Ocean propagation problems--Dispersion, and Energy spread; Coastal problems--Amplification at small islands and shoals, and Coastal resonance.

AD-427 130 Div. 9, 12
OTS price $1.50

Aeronautical Systems Div., Air Force Systems Command, Wright Patterson Air Force Base, Ohio.
APPLICATION OF AERODYNAMIC LIFT IN ACCOMPLISHING ORBITAL PLANE CHANGE,
by Roland N. Bell and Wilbur L. Hankey, Jr.
Sep 63, 42p.
ASD TDR63 693 Unclassified report

Presented at the ASD 1963 Science and Engineering Symposium, 18-19 Sep 63.

Descriptors: (*Boost-glide vehicles, Aerodynamic characteristics), Maneuverability, Manned spacecraft, Hypersonic characteristics, Optimization, Orbital trajectories, Analysis, Atmosphere entry, Descent trajectories, Propulsion, Hypersonic flow, Angle-of-attack, Attitude control systems, Thrust vector control systems.

This study considers the concept of a hypersonic glider-type spacecraft utilizing its aerodynamic maneuvering capability in performing orbital plane change. For lifting vehicles an optimization procedure is developed which defines the proper vehicle attitude, propulsion utilization and sequence of operations to produce the maximum plane change for a given fuel expenditure. The results obtained are compared with the fuel requirements for a pure propulsion (nonlifting) plane change while remaining in orbit. Specifically, the optimum bank angle, angle of attack, entry angle, thrust alignment and thrusting procedures are defined. In addition, the advantages of high L/D vehicles are graphically illustrated. The method is seen to be more efficient than the pure propulsion method, but is found to be far more complex and requires longer times to execute. (Author)

AD-427 156 Div. 9
OTS price $10.10

Defense Research Lab., U. of Texas, Austin.
PRANDTL NUMBER DISTRIBUTION IN A TURBULENT BOUNDARY LAYER WITH HEAT TRANSFER AT SUPERSONIC SPEEDS,
by William C. Rochelle. Oct 63, 1v. Rept. no. 508
Grants DA ORD31 124 61G3, DA ORD D31 124G132;
Proj. 2521E
AROD 2521 3 Unclassified report

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-427 886 Div. 8, 30, 32
OTS price $9.10

North American Aviation, Inc., Los Angeles, Calif.
AUTOMATIC PROCESSING OF WIRING DATA.
Bi-monthly rept. no. 3, 20 Sep-30 Oct 63.
1 Nov 63, 97p. Rept. no. NA63 783 2
Contract NOw63 0488d
Unclassified report

Descriptors: (*Wire, Data processing systems), Wiring diagrams, Military requirements, Digital recording systems, Computer logic, Coding, Recording paper, Magnetic tape, Printing, Digital systems, Input-output devices, Programming (Computers), Standards, Automatic, Catalogs.

The basic premise of this project was to utilize procedures already established for production of Automatically Processed Wire Lists. Input data (signal codes) and output documentation (computer logic and formats) were designed to extend these procedures to include the Wire List-Systems. Descriptions and illustrations in this report are typical. They are not intended to establish specific requirements or to limit documents used within the Contractor's functional organization. One of the chief advantages of computer-filed data is the flexibility of its procedural application. The communication of engineering information in many formats all produced from a single computer-stored source improves on the reliability of the data while simultaneously reducing costs. Section II, Growth Potential, of this report indicates several directions in which the processing of engineering data is expected to extend. (Author)

AD-427 890 Div. 8, 26
OTS price $1.60

Westinghouse Electric Corp., Philadelphia, Pa.
PRODUCTION ENGINEERING MEASURE TYPE 2N1814 SILICON ALLOY TRANSISTOR.
Quarterly progress rept. no. 1 for period ending 30 Sep 63.
30 Sep 63, 16p.
Contract DA36 039AMC03617E
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), Silicon alloys, Production, Industrial equipment, Processing, Diffusion, Soldering, Reliability (Electronics), Test equipment (Electronics), Encapsulation, Furnaces.

Efforts concern the improvement of production techniques to increase the reliability for high power silicon alloy transistor 2N1814. Progress on the initial phases of product improvement through refined process and equipment control is described. Programs designed to validate the proposed changes are also described. (Author)

AD-427 897 Div. 8, 26
OTS price $6.60

Aerospace Corp., Los Angeles, Calif.
ANALYSIS AND SIMULATION OF THE ANTENNA CONTROL SYSTEM FOR THE SPACE RADIO SYSTEMS FACILITY,
by E. E. Reber and I. J. Williams. 21 Dec 63, 55p. Rept. no. TDR269 4250 41 1
Contract AF04 695 169
SSD TDR63 194 Unclassified report

Descriptors: (*Antennas, Control systems), (*Hydraulic systems, Antennas), Simulation, Wind, Mathematical models, Millimeter waves, Hydraulic valves, Loading (Mechanics), Positioning devices (Machinery).

A design, analysis, and simulation of a hydraulic antenna-positioning control system for the millimeter wave antenna of Space Radio Systems Facility is presented. The design and analysis are based upon linearized models of the components to be used for the proposed system. An analog simulation, performed to verify the design and analysis, to investigate relative signal levels, and to determine the effects of wind disturbances and non-linearities, is described. It is shown that a system of this type can be designed to give satisfactory performance in the presence of expected nonlinearities and wind disturbances. (Author)

AD-427 898 Div. 8, 26, 17
OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
ELECTRONICS RESEARCH PROGRAM. INVESTIGATION OF ELECTRONIC PROPERTIES OF THIN FILMS.
Semiannual technical note, 1 Jan-30 June 63, by F. L. Vernon, R. J. Pedersen and J. Crumley.
25 Nov 63, 21p. Rept. no. TDR169 3250 12 TN2
Contract AF04 695 169
SSD TDR63 316 Unclassified report

Descriptors: (*Dielectric films, Soaps), (*Semiconducting films, Sandwich construction), (*Metal films, Semiconductor devices), Cleaning, Vapor plating, Quartz, Rods, Tin, Lead, Oxides, Aluminum, Aluminum compounds, Superconductors, Phonons, Microwaves, Processing, Vacuum apparatus, Electrical conductance, Surface properties.

The effects of a variety of parameters on the formation of metallic stearate films are discussed. Substrate cleaning techniques and the role of the spreading solvent are emphasized. A new method for the deposition of the initial organic monolayer is described; in many respects this method has proven superior to the original Langmuir-Blodgett technique. Reliable metal-oxide tunneling junctions on the end of thin quartz rods were fabricated for configurations of the type Al-Al2O3-Mx. These junctions, used in studying the effect of microwave phonons on superconductive tunneling, proved difficult to make because of the small configurations required. Special techniques for handling these small structures are discussed. A new evaporator is described which will provide flexibility in fabricating thin film electronic devices. (Author)

flowing in a channel was undertaken. Air and other gases were ionized within the channel and an electrostatic field was applied normal to the flow direction. Increases in pressure drop and heat transfer of the order of two to one were found with the application of the field. It was also observed that the velocity profiles in the channel were greatly distorted due to the action of the field. Extensive data are presented on the variation of friction factor, velocity profile, and heat transfer with ion current. The significance of these results lies in the fact that large changes were observed when the ionization level is very low, of the order of 1 ion to 10 to the ninth power neutrals in gas at standard conditions. (Author)

AD-427 273 Div. 9, 25
OTS price $2.25

Air Force Aero-Propulsion Lab., Aeronautical Systems, Div., Wright-Patterson Air Force Base, Ohio.
AN ANALYSIS OF THE EFFECT OF IONIZATION ON THE LAMINAR FLOW OF A DENSE GAS IN A CHANNEL, by Henry R. Velkoff. Oct 63, 87p.
Proj. 3141
RTD TDR63 4009 Unclassified report

Descriptors: (*Gas flow, Ions), (*Electrostatics, Gas flow), (*Magnetohydrodynamics, Pressure), Friction, Distortion, Laminar boundary layer, Electric discharges, Electrical corona, Equations, Interference, Laminar flow, Electrostatic fields.

An analysis was performed on the actions of ions in a laminar flow stream. The analysis seeks to provide an explanation for the unusually high pressure drops found during a preceding experimental program involving laminar flow of ionized gas with an applied electrostatic field. The analysis revealed that very high pressure drops could be expected and that velocity profile distortions would occur. Good corelation with test data was achieved. A new nondimensional parameter, called the charge number, was introduced. Charge number is related to the Knudsen number and is the controlling parameter for ion action in the gas stream. The conclusion is that ions bound electrically to a flow stream set up an internal field on the stream, and then tend to resist the motion of the stream. This action causes profile distortions and increases effective fluid friction. (Author)

AD-427 295 Div. 9, 25, 26
OTS price $13.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BULLETIN OF HIGHER EDUCATIONAL INSTITUTIONS (SELECTED ARTICLES).
30 Sep 63, 187p.
FTD TT62 1111 Unclassified report

Trans. from Izvestiya Uchebnykh Zavedeniy, Aviatsionnaya Tekhnika, No. 3, pp. 3-30, 38-68, 89-99 and 113-180 1961.

Descriptors: (*Aeronautics, Reports), Mathematics, Aerodynamic characteristics, Aerodynamic configurations, Kinetic theory, Gas flow, Theory, Mechanics, Deformation, Conical bodies, Wings, Mechanical properties, Compressible flow, Ductility, Tensile properties, Wing-body configuration, Curved profiles, Slotted flaps, Sandwich panels, Honeycomb cores, Fuselages, Torque, Machining, Gliders, Flutter, Cylindrical bodies, Prismatic bodies, Subsonic flow, Ring wings, Interference, Errors, Stretch forming.

Contents: On the Calculation of the Aerodynamic Characteristics of Thin Curved Bodies and Curved Surface Wings; The Calculation of the Kinetic Energy of a System of Linked Bodies; An Experimental Investigation of the Effectiveness of Certain Types of Flat-Stream Discharge of Gas onto a Profile with a Flap; Symmetrical Bending of Nonsymmetrically Constructed Sandwich Plates with Lightweight Cores; Calculations for Torsion in Fuselage in Region of Wing Midsection; Calculation of the Strength of Conical Shells of the Wing with Small Aspect Ratio Type; Application of Potential-Flow Scheme of an Ideal Fluid to Calculation of an Airstream with a Region of Backflow; On the Problem of Determining the Technological Parameters in the Bending and Stretching of Profile Parts; Determination of Placement Errors of Surface in Machining Components; Flutter Calculations for Towed Glider Taking Account of Three Degrees of Freedom; Calculations of Cylindrical and Prismatic Shells by the Method of Discrete Unknowns; (Other titles included).

AD-427 299 Div. 9, 31
OTS price $19.75

RCA Defense Electronic Products, Burlington, Mass.
HYDROFOIL AUTOPILOT SYSTEM DESIGN STUDY PROGRAM.
Engineering summary rept.
Jan 62, 1v.
Contract NObs84498, Task 1709
Unclassified report

Descriptors: (*Hydrofoil boats, Design), (*Hydrofoils, Design), Control systems, Pitch (Motion), Roll, Yaw, Hydrodynamic configurations, Specifications, Performance (Engineering), Equations, Ocean waves, Accelerometers, Stability, Velocity, Hydraulic servomechanisms, Ailerons, Deflection, Lift, Simulation, Rotation, Foils.

An analysis techniques was employed to study the control system designs for a 110-ton and 300-ton hydrofoil craft. It is felt, generally fulfill these requirements and, in conjunction with the nonlinear simulation, may be expected to yield an accurate indication of prototype performance for conditions not involving hull impact or foil broaching. The accurate simulation of these two phenomena add substantial complexity to the simulation and were not included in this study (total loss of lift with a broaching foil was simulated). A total of 610 simulation runs were made. In this first section, a list of symbols covering those used for both the longitudinal and lateral analyses are presented and a detailed description of the geometric configuration of both craft (110-ton and 300-ton) may also be found. Two studies were made longitudinal and lateral control system studies.

AD-427 313 Div. 9, 30
OTS price $1.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
PUBLICATIONS OF VON KARMAN GAS DYNAMICS FACILITY, ARO, INC.
Jan 64, 1v.
Unclassified report

Descriptors: (*Reports, Research program administration), Aerodynamic characteristics, Thermodynamics, Hypersonic wind tunnels, Supersonic wind tunnels, Test, Instrumentation, Hypervelocity guns, Terminal ballistics, Calibration.

This is a listing of widely-distributed publications (reports, articles, proceedings, etc.) of

Descriptors: (*Turbulent boundary layer, Supersonic characteristics), Temperature, Velocity, Heat transfer, Shear stresses, Aerodynamic heating, Thermal conductivity, Compressible flow, Theory, Mathematical analysis, Motion, Equations, Partial differential equations, Fluid dynamic properties, Flat plate models, Surfaces, Friction.

An investigation is described which determined the Prandtl Number distribution across a turbulent, compressible boundary layer, both with and without heat transfer at the wall. The calculations were performed by integrating the continuity, momentum, and energy equations, and by using an iteration process to determine the velocity and temperature profiles. Several assumed temperature-velocity polynomials were developed and were checked for accuracy by means of the iteration process. Experimentally determined values of temperature, pressure, shear stress, heat transfer, Prandtl Number and velocity parameters and the Mach Number distribution across the boundary layer for two axial stations on a flat plate were used as the input parameters for an electronic digital computer. The Prandtl Numbers for the adiabatic cases ranged from about 0.89 near the wall to about 10 near the free stream for a wide range of Mach and Reynolds Numbers. For the heat transfer cases, the Prandtl Numbers varied from about 0.75 near the wall to a value of about 1.0 near the free stream when using a fourth-order temperature-velocity equation. (Author)

AD-427 208 Div. 9, 31
OTS price $3.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
SURFACE-PIERCING HYDROFOIL FLUTTER,
by Charles J. Henry and M. Raihan Ali. Nov 63, 25p. Rept. 992.
Contract Nonr26349, Proj. 2575049
Unclassified report

Descriptors: (*Hydrofoil boats, Hydrofoils), (*Hydrofoils, Flutter), Lift, Model tests, Theory, Equations, Ocillation, Weight, Supports, Hydrodynamics, Two-dimensional flow, Elasticity, Surface properties.

Measured values of the flutter speed and response characteristics of an aspect-ratio-4, surface-piercing strut supported with two degrees of freedom are compared with values predicted for two-dimensional flow in an infinite fluid. The measured and predicted flutter speeds and frequencies are in agreement, but the predicted damping at speeds below flutter is considerably higher than measured values. Reasons to doubt the reliability of infinite fluid theory for hydrofoil flutter speed prediction are discussed. (Author)

AD-427 231 Div. 9, 30
OTS price $2.25

Rosemount Engineering Co., Minneapolis, Minn.
DEVELOPMENT OF AERODYNAMICALLY COMPENSATED PITOT-STATIC TUBES FOR USE ON THE XB-70 AIRCRAFT,
by Richard V. DeLeo and Floyd W. Hagen. Nov 63, 74p.
Contract AF33 600 42658, Proj. 8201, Task 820112
RTD TDR63 4085 Unclassified report

Descriptors: (*Pitot tubes, Design), (*Tests, Wind tunnel models), Aircraft, Measurement, Pressure, Aerodynamic characteristics, Angle of attack, Subsonic flow, Supersonic flow, Performance (Engineering), Ogives, Nose cones.

Two types of aerodynamically compensated pitot-static tubes were investigated to find a design suitable for flight testing on the XB-70 aircraft. Both theoretical analysis and wind tunnel experiments were used to determine subsonic and supersonic performance of a number of models of each of the two types. The level of aerodynamic compensation, compatible with XB-70 pressure errors, was generally predicted with good accuracy using theoretical methods. Empirical results were used to determine the static pressure effect due to cutting off the tip of the contour-nose units to form a pitot opening and to determine angle of attack influences for the static ports on both types. (Author)

AD-427 232 Div. 9, 25
OTS price $2.60

Institute for Defense Analyses, Washington, D. C.
THE EFFECT OF FINITE PRESSURE-PULSE DURATION OF THE UNIFORM DEFORMATION OF A LONG CYLINDRICAL SHELL,
by William Nachbar. Sep 63, 25p. RP P41; Hq 63 2022
Contract SD50
Unclassified report

Descriptors: (*Structural shells, Deformation), (*Pressure, Cylindrical bodies), Incompressible flow, Plasticity, Fourier analysis, Elastic shells, Stresses, Inequalities, Vibration, Loading (Mechanics).

A long cylindrical shell without end loads or restraints is considered to be loaded uniformly by external pressure applied as a rectangular-shaped pulse in time. It is assumed that the shell material is elastic and perfectly plastic, that the material points in the shell move only in the radial direction, and all points on the mid-surface of the shell have the same motion in time. This investigation is directed towards determining the impulse which must be delivered to the shell to cause it to fail. The criterion imposed is that the shell can be said to fail if the nondimensional radial displacement is brought to a prescribed displacement at failure. This value can be attained by applying to the shell a nondimensional pressure, P sub o, over a nondimensional pulse duration time, T. The product of these two values is the impulse at failure. For fixed values of displacement at failure and pulse duration time, the failure impulse is that impulse for which $dw/dt>0$ for $0<t<t_f$, and $dw/dt=0$ at $t=t_f$. This will be taken henceforth as the definition of impulse at failure. (Author)

AD-427 234 Div. 9, 25
OTS price $2.50

Research and Technology Div., Air Force Systems Command, Washington, D. C.
AN EXPLORATORY INVESTIGATION OF THE EFFECTS OF IONIZATION ON THE FLOW AND HEAT TRANSFER WITH A DENSE GAS.
Rept. for May 62-May 63,
by Henry R. Velkoff. Nov 63, 94p.
Proj. 3141
ASD TDR63 842 Unclassified report

Descriptors: (*Gases, Heat transfer), (*Gas flow, Ionization), Gas ionization, Fluid flow, Ionic current, Pressure, Air, Electrostatic fields, Velocity, Distortion, Experimental data, Friction, Standards.

An investigation of the effects of ion motion on the pressure drop and heat transfer of a gas

spectrum of a scalar additive in a wake are qualitatively discussed. Comparison of predicted values of gas density fluctuation with experimental results show encouraging agreement, and warrant further development of the model.

AD-427 696 Div. 9
OTS price $2.60

Naval Air Test Center, Patuxent River, Md.
FLIGHT TEST EVALUATIONS OF AIRPLANE DYNAMIC LONGITUDINAL STABILITY IN THE LOW ALTITUDE HIGH SPEED REGION,
by Thomas M. McPherson and Kenneth W. Weir.
Mar 63, 26p.
Unclassified report

Descriptors: (*Jet bombers, Flight testing), (*Jet fighters, Flight testing), Pitch (Motion), Aerodynamic characteristics, Low altitude, Oscillograph, Telemetering data, Pilots, Attack bombers, Stability, Damping, Human engineering, Oscillation, Subsonic characteristics, Roll, Airspeed.

A discussion is presented of requirments for a low altitude high speed dynamic stability investigation and the aerodynamics involved. Also discussed are the location and facilities of the test site in relation to the investigation. Special test instrumentation, airplane modifications, and flight test techniques are covered. Test results are discussed and figures presented to illustrate the problem encountered on one of the test airplanes. Possible solutions to the problem are presented. (Author)

AD-427 728 Div. 9
OTS price $3.60

United States Rubber Co., Wayne, N. J.
LITERATURE SEARCH INTO METHODS OF DAMPING OUT INCIPIENT TURBULENCE IN THE FLOW OF LIQUIDS. Final rept.,
by J. Thompsen, F. W. Boggs and N. Tokita.
9 Jan 64, 1v.
Contract DA30 069AMC287T; Proj. RC100 63 23
Unclassified report

Descriptors: (*Turbulence, Fluid flow), (*Liquids, Damping), (*Damping, Bibliographies), (*Bibliographies, Damping), (*Abstracts, Damping), Laminar flow, Turbulent boundary layer, Incompressible flow, Flat plate models, Pipes, Transition temperature, Coatings.

The problem of delaying transition from laminar to turbulent flow has long been under investigation. This report presents a bibliography on the work that has been done for the last 40 to 50 years on this problem of transition, specifically for incompressible flow, over flat plates or in pipes. The articles included in this list are concerned with two questions: (1) What is the mechanism of transition, and (2) How can transition be delayed. Although an extensive amount of work has been done and is still being done on the problem of delaying transition on relatively flat surfaces by means of compliant coatings, it does not appear feasible to extend this method to pipes except to a limited extent. However, recent work has indicated that the addition of non-Newtonian additives to the flow may be a promising way of delaying transition in piping systems, such as hydraulic line, normally found in industry. It should be noted that reduction of noise in pipes is possible with the use of flexible surfaces. (Author)

AD-427 736 Div. 9
OTS price $2.00

Minnesota U., Minneapolis.
VELOCITY DISTRIBUTION IN THE WAKE OF BODIES OF REVOLUTION BASED ON DRAG COEFFICIENT,
by Helmut G. Heinrich and Donald J. Eckstrom.
Dec 63, 62p.
Contract AF33 616 8310; Proj. 6065; Task 606503
ASD TDR62 1103 Unclassified report

Report on aerodynamic deceleration.

Descriptors: (*Bodies of revolution, Wake), (*Wake, Fluid dynamic properties), Turbulence, Theory, Drag, Fluid flow, Velocity, Motion, Differential equations, Conical bodies, Disks, Hemispherical shells, Wind tunnel models, Model tests, Blunt bodies, Ogives, Subsonic flow, Distribution.

A theoretical analysis of the turbulent wake behind a body of revolution has been made, and an equation for the velocity distribution in the wake has been found in terms of four constants which are determined from experiments. Measurements of the velocity distribution in the wake behind twelve bodies of revolution are presented, and the four constants for each body are derived. A generalization of the empirical constants in terms of body drag coefficient is made. Calculations using the empirical constants compare satisfactorily with measured distributions. (Author)

AD-427 748 Div. 9
OTS price $1.50

Minnesota U., Minneapolis.
PRESSURE DISTRIBUTION IN THE WAKE OF TWO BODIES OF REVOLUTION AT TRANSONIC AND SUPERSONIC SPEEDS,
by Helmut G. Heinrich and R. Sheldon Hess.
Dec 63, 47p.
Contracts AF33 616 6372, AF33 616 8310; Proj. 6065; Task 606503
ASD TDR62 1104 Unclassified report

Descriptors: (*Bodies of revolution, Wake), (*Wake, Fluid dynamic properties), Drag, Ogives, Conical bodies, Hemispherical shells, Cylindrical bodies, Transonic characteristics, Supersonic characteristics, Model tests, Wind tunnel models, Supersonic flow, Transonic flow, Pressure, Measurement, Flow visualization, Velocity, Distribution.

An experimental investigation of the wake of two bodies of revolution at transonic and supersonic speeds has been conducted. Static pressure and Mach number distribution along the wake centerline and total pressure profiles across the wake are presented. (Author)

AD-427 768 Div. 9, 30
OTS price $2.60

Institute of Engineering Research U. of Calif. Berkeley.
FLAT PLATE SKIN FRICTION IN LOW DENSITY HYPERSONIC FLOW-APPARATUS DEVELOPMENT,
by E. S. Moulic. Dec 63, 15p.
Contract AF33 657 8607; Proj. 7064; Task 7064 01
ARL 63 224 Unclassified report

Report on Aerothermodynamic Investigations in High Speed Flow.

Descriptors: (*Hypersonic flow, Test equipment), (*Flat plate models, Friction), Leading edge, Instrumentation, Wind tunnel

the von Karman Gas Dynamics Facility, ARO, Inc., issued before January 1, 1964. The publications are listed in chronological order according to subject and an author index is provided. (Author)

AD-427 335 Div. 9
OTS price $14.00

United Aircraft Corp., East Hartford, Conn.
FLUID AMPLIFICATION. 6. AERODYNAMIC STUDIES OF FREE AND ATTACHED JETS,
by Robert E. Olson and David P. Miller.
14 Oct 63, 1v. Rept. no. A1771 24
Contract DA49 186ORD912
Unclassified report

Supersedes rept. no. A1171 16, AD-297 023.

Descriptors: (*Fluid flow, Amplifiers), (*Amplifiers, Fluid flow), (*Jets, Aerodynamic characteristics), Turbulence, Theory, Compressible flow, Analysis, Mathematical models, Experimental data, Velocity, Pressure, Nozzles, Measurement, Distribution, Weight, Diffusers.

Theoretical and experimental investigations were conducted to provide information regarding the aerodynamic characteristics of two-dimensional turbulent compressible jets. The investigations included studies of free jets, wall jets, and reattaching jets. The theoretical investigations provided analytical models for the three types of jet flows, procedures for predicting the velocity profile development characteristics for free jets and wall jets and a procedure for predicting the reattachment location and mean pressure in the separation bubble for reattaching jets. The experimental studies which were conducted provided data to substantiate the analyses and to evaluate empirical constants. These data included measurements of the flow profiles at various stations downstream of the nozzle exit for the three types of jet flows. For the reattaching jets additional measurements were made of wall static pressure distributions, reattachment locations, and the pressure recovery and weight-flow characteristics of diffusion systems located downstream of the reattachment point. (Author)

AD-427 410 Div. 9
OTS price $8.60

Navy Electronics Lab., San Diego, Calif.
FLOW NOISE OF STREAMLINED BODIES FALLING FREELY IN WATER,
by P. O. Laitinen. 19 Sep 63, 90p.
NEL 1182 Unclassified report

Descriptors: (*Free falling models, Underwater), (*Underwater sound, Free falling models), Noise, Hydrodynamic configurations, Hydrophones, Instrumentation, Boundary layer, Pressure, Velocity, Theory, Noise analyzers, Design, Fluid flow, Turbulence, Fluid mechanics, Turbulent boundary layer, Aerodynamic characteristics, Conical bodies, Model tests.

Sound pressure fluctuations were measured by single hydrophones imbedded in streamlined, plastic, laminar flow bodies about 10 inches long and with trailing cables while the bodies dropped through water at Lake Pend Oreille, Idaho. The pressure levels approximated those of the ambient noise measured with the bodies submerged at rest, unless the body boundary layers were intentionally tripped into turbulence by tripping wires. Relative broadband pressure values and relative pressure spectra were derived and are explained along with applicable flow noise theory. (Author)

AD-427 611 Div. 9, 30
OTS price $2.60

Polytechnic Inst. of Brooklyn, N. Y.
A REVIEW OF THE WORK PERFORMED AT THE POLYTECHNIC INSTITUTE OF BROOKLYN AEROSPACE INSTITUTE,
by Antonio Ferri and Victor Zakkay. Dec 63, 24p.
Contract AF33 616 7661, Proj. 7064, Task 706401
ARL 63 227 Unclassified report

Descriptors: (*Fluid mechanics, Scientific research), (*Hypersonic flow, Scientific research), Fluid flow, Two-dimensional flow, Three-dimensional flow, Boundary layer, Density, Supersonic flow, Viscosity, Aerodynamic characteristics, Transport properties, Hypersonic flow, Combustion, Hypersonic nozzles, Shroud rings, Aerothermoelasticity, Rocket research, Thermochemistry, Stagnation point, Gas flow, Heat transfer, Laminar boundary layer, Chemical reactions, Laminar flow, Supersonic characteristics, Superaerodynamic.

Theoretical and experimental investigations of problems connected with hypersonic flows and hypersonic wind tunnels are reviewed. This research is concerned with two-and three-dimensional boundary layer flows and the determination of the pressure distribution about hypersonic bodies. A study of low density effects at hypersonic speeds is made both theoretically and experimentally. During the early part of the research a study of an advanced device for hypersonic wind tunnel operation is carried out. An investigation of supersonic combustion is made. Theoretical and experimental results of mass transfer are presented. Finally, some problems bearing on thermochemistry and real gas effects are investigated. (Author)

AD-427 686 Div. 9, 25, 12, 6
OTS price $3.60

Heliodyne Corp., Los Angeles, Calif.
A NEW QUASI ONE-DIMENSIONAL MODEL FOR TURBULENT WAKE MIXING,
by Andrew P. Proudian. Jan 64, 26p. Research note 13
Contract DA04 495ORD3574Z; ARPA Order 360 62
Unclassified report

Report on Project Defender.

Descriptors: (*Wake, Jet mixing flow), (*Reentry vehicles, Wake), Turbulence, Mathematical models, Temperature, Density, Velocity, Heat transfer, Convection, Radar echo areas, Electron density, Thermodynamics, Gas flow, One-dimensional flow, Fluid dynamic properties, Electron density.

A new model for turbulent wake mixing is proposed. The model, which appears supported by laboratory experiments and which is made plausible on physical grounds, considers the wake as consisting of a ''marble cake'' struture of hot and cold lumps being mixed into the wake by the large eddies of the turbulent wake. A dynamical (one-dimensional) model for the mixing leads to a simple set of equations which can be numerically integrated to yield the temperature, density and velocity of the hot and cold wake components. The inclusion of chemistry in the model would yield wake composition. The model permits the prediction of mean square mass and electron density fluctuations. The fluctuations are assumed to arise from random convection of inhomogeneous fluid elements, rather than by compressibility effects or dissipation associated with the turbulent velocity field. The consequences of such mixing for the

Progress rept. for Feb 63,
by Fred K. Meeks. 22 Mar 63, 6p.
Contract Now61 0926

Unclassified report

Descriptors: (*Vertical take-off planes, Downwash), Gas turbines, Airplane engines, Helicopter engines, Turbine blades, Sand, Erosion, Model tests, Test facilities, Duct inlets, Ingestion (Engines), Compressor blades, Damage.

An administrative report is made of model tests of the effect of sand ingestion on gas turbine compressor blades. (Author)

AD-427 844 Div. 9, 1, 30
OTS price $1.10

Kellett Aircraft Corp., Philadelphia, Pa.
EXPERIMENTAL INVESTIGATION TO DETERMINE THE INFLUENCE OF AIR-FRAME GEOMETRY IN ALLEVIATION OF OPERATIONAL PROBLEMS DUE TO DOWNWASH EFFECTS ON VTOL AIRCRAFT.
Progress rept. for Nov 62,
by F. K. Meek. 18 Dec 62, 6p.
Contract NOw61 0926C

Unclassified report

Descriptors: (*Vertical take-off planes, Propellers (Aerial)), (*Propellers (Aerial), Erosion), Downwash, Sand, Model tests, Airframes, Aerodynamic configurations.

An administrative report is given of experimental tests of sand erosion on propeller blades. (Author)

10. FUELS AND COMBUSTION

AD-427 123 Div. 10, 30
OTS price $3.00

Rocketdyne, Canoga Park, Calif.
STUDY TO FIND SIMULANTS FOR FUELS FOR USE IN STRUCTURES FATIGUE TESTING.
Rept. for Apr 62-Jan 63.
Nov 63, 173p.
Contract AF33 657 7901, Proj. 1347, Task 134704
ASD TDR63 405 Unclassified report

Report on Structural Testing of Flight Vehicles.

Descriptors: (*Liquid rocket propellants, Simulation), (*Solid rocket propellants, Simulation), (*Simulation, Rocket propellants), Vegetable oils, Liquid rocket fuels, Liquid rocket oxidizers, Solid rocket oxidizers, Ammonium compounds, Sulfates, Aluminum, Ethers, Nitrogen compounds, Tetroxides, Hydrazine derivatives, Water, Butyl rubber, Halogenated hydrocarbons, Solid rocket propellant binders, Safety, Physical properties, Thermodynamics, Vapor pressure, Thermal conductivity, Specific heat, Viscosity, Tables, Nomographs, Mathematical analysis, Test methods, Perchlorates.

Several physical properties of simulants for five liquid propellants and one solid propellant were compared with those of the particular propellant over a wide temperature range. The materials selected as simulants duplicate to a great extent the properties of the 'live' ingredients, while being neither a toxicity nor a fire hazard. (Author)

AD-427 230 Div. 10, 4
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
MATERIALS AND STRUCTURES, HIGH-TEMPERATURE CHEMISTRY.
Semiannual technical rept., 1 Jan-30 June 63,
by J. E. Colwell, T. J. Dudek, T. S. Lee, F. M. Wachi and M. T. O'Shaughnessy. 20 Nov 63, 12p.
Rept. no. TDR169 3240 22TR1
Contract AF04 695 169
SSD TDR63 321 Unclassified report

Descriptors: (*Halocarbon, plastics, Combustion), (*Elastomers, Mechanical properties), (*Electrical properties, Elastomers), (*Spectroscopy, Flames), Fluorine compounds, Heat shields, Wake, Gases, Infrared radiation, Ionization, Instrumentation, Laboratory equipment, Alkanese, Electron density, Electron transitions, Synthetic rubber, Dielectric properties, Polyethylene plastics, Styrene plastics, Tensile properties, Stresses, High-temperature research, Radiofrequency spectroscopy, Viscoelasticity, Polymers, Molecular structure, Pressure, Deformation, Creep.

The work described in this report consists of studies of combustion of Teflon monomer (C_2F_4), and studies of mechanical and electrical properties of polymers. In the Teflon flame studies, CF_2 has been detected spectroscopically in both diffusion and premixed flames; CF was detected, with less certainty, in diffusion flames. In the polymer investigations, styrene-butadiene and ethylene-propylene rubbers of graded crosslink density have been studied mechanically in tension. A pulse method, devised for the very rapid measurement of dielectric constant and loss, is being evaluated.

AD-427 341 Div. 10
OTS price $1.10

Bureau of Naval weapons, Navy Dept., Washington, D. C.
SAFETY, STORAGE, AND HANDLING INSTRUCTIONS FOR OTTO FUEL COMPOSITION II AND III,
by J. W. Murrin and J. G. Tuono. 15 Nov 63, 11p.

Unclassified report

Descriptors: (*Instruction manuals, Liquid rocket fuels), (*Liquid rocket fuels, Safety), (*Safety, Liquid rocket fuels), (*Hazards, Liquid rocket fuels), Handling, Storage, Nitrates, Esters, Stability, Compatibility.

AD-427 863 Div. 10, 4
OTS price $1.60

Aerojet-General Nucleonics, San Ramon, Calif.
SELECTED SYNTHESIS BY FISSION FRAGMENT RECOIL.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 63,
by A. R. Miller. Jan 64, 21p. Rept. no. AN1119
Contract AF04 611 9069, Task 314801

Unclassified report

Descriptors: (*Liquid rocket oxidizers, Synthesis (Chemistry)), (*Fission products, Radiation chemistry), Uranium compounds, Fluorides, Nitrogen compounds, Fluorine, Oxygen, Fluoroamines, Electron capture, Thermal conductivity, Halogenated hydrocarbons, Chromatographic analysis, Mass spectroscopy, Radiation chemistry, Fluorine compounds, Oxygen compounds, Chlorine compounds.

Work on a program to synthesize two high-energy, liquid oxidizers by fission fragment radiolysis is described. Calibration of the fuel-capsule system was completed. Four irradiations to synthesize Compound A were carried out. Analysis of the irradiation products was delayed because

models, Surfaces, Boundary layer, Angle of attack, Hypersonic characteristics, Drag, Surface properties, Boundary layer, Interference.

An apparatus was designed to measure local skin friction near the sharp leading edge of a flat plate by the floating element technique in a low density Mach 6 wind tunnel. It was found that the accuracy of the data was strongly influenced by extremely small irregularities on the model surface. It was concluded that further model refinement was needed. Even though the data were of marginal quality they suggested that the skin friction was less than predicted by strong interaction boundary layer theory. (Author)

AD-427 769 Div. 9, 25, 27
OTS price $2.75

Carnegie Inst. of Tech., Pittsburgh, Pa.
UNCONVENTIONAL METHODS FOR INFLUENCING FLUID FLOW.
Final rept.
Nov 63, 123p.
Contract AF33 657 9914; Proj. 8169; Task 816904
ASD TDR63 776, vol. 1
Unclassified report

Descriptors: (*Heat, Energy conversion), (*Electromagnetic pumps, Design), (*Electricity, Energy conversion), (*Acoustics, Energy conversion), Fluids, Capillary tubes, Valves, Equations, Electricity, Pumps, Electrodes, Gas turbines, Thermoelectricity, Energy, Sound, Piezoelectric transducers, Induction systems, Heat transfer, Ions, Dielectrics, Electric motors, Magnetic fields, Cooling, Refrigeration systems, Semiconductors, Decontamination, Pressure, Pipes, Conical bodies, Electrophoresis.

A number of related problems concerning the utilization of unconventional effects for the purpose of affecting the behavior of fluids are investigated. Effects capable of directly converting thermal or electrical power into pumping power without the use of moving mechanical parts are studied. A means of improving the thermoelectric cooling of liquids is investigated. A way of decontaminating fluids by an electrical effect is studied. Finally, a scheme for suppressing pressure surges in flowing fluids is examined. The subject areas examined were as follows: thermal pumping, thermoelectric-hydromagnetic pumping, electrokinetic energy conversion, acoustic pumping, the winslow effect valve, electromagnetic induction pumping, the sumoto ion motor, influence of a magnetic field on thermoelectric cooling, decontamination by dielectrophoresis, and attenuation of pressure surges by tapered pipes. (Author)

AD-427 833 Div. 9, 31
OTS price $3.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
BLADE FREQUENCY HARMONIC CONTENT OF THE POTENTIAL WAKE OF SINGLE SCREW SHIPS,
by J. P. Breslin and C. L. Odenbrett. Apr 63, 1v.
Rept. no. 956
Contract Nonr26346, Proj. Mu2514
Unclassified report

Descriptors: (*Wake, Harmonic analysis), (*Propellers (Marine), Ships), Numerical analysis, Velocity, Propeller blades, Thrust, Torque, Fluid flow, Mathematical models, Perturbation theory, Bessel functions, Ship hulls, Theory, Vibration, Viscosity, Hydrodynamics, Boundary layer.

Using thin ship theory, approximate formulas are developed for the axial velocity at the propeller plane. Harmonic analysis of the flow variation at one radius is carried out to provide the harmonic content at the propeller plane of U- and V-sectioned hull forms and a strut of infinite draft for which the exact solution is known. These results are compared with the harmonic content obtained from experimental model data. The potential wake harmonics are compared with those obtained from model tests and are found to be much smaller. An estimate is made of the harmonic content of the viscous wake. Vibratory thrust computations for a specific propeller, using the wake velocities of the U- and V-sectioned hull forms, are included. It is concluded that the potential flow contribution to the harmonic content of the flow at the propeller plane and the resultant vibratory thrust is of an order of magnitude smaller than that which arises from viscous effects. (Author)

AD-427 838 Div. 9
OTS price $7.60

Technische Hochschule, Aachen (Germany).
LAMINAR BOUNDARY LAYERS AT CURVED SURFACES.
Annual summary rept. no. 3, 1 July 62-30 June 63, by F. Schultz-Grunow and W. Breuer. 30 June 63, 75p.
Contract AF61 052 634
ARL 64 20 Unclassified report

Descriptors: (*Laminar boundary layer, Curved profiles), Transformations (Mathematical), Series, Velocity, Tables, Analysis, Equations, Pressure, Distribution, Numerical analysis, Integration, Shear stresses, Thickness.

AD-427 841 Div. 9, 31
OTS price $5.60

Technical Research Group, Syosset, N. Y.
ANALYTICAL STUDY OF FORCED SHIP MOTIONS.
Final rept., 1 Oct 62-30 Sep 63.
20 Sep 63, 39p. Rept. no. 126FR A
Contract Nonr269200, Proj. SR009 0101
Unclassified report

Descriptors: (*Ships, Motion), (*Motion, Ships), Velocity, Damping, Ellipsoids, Water waves, Slender bodies, Theory, Equations, Harmonic oscillators, Roll, Pitch (Motion) Yaw, Gravity, Oscillation, Hydrodynamics.

Various results in the theory of ship motions are described. The Kramers-Kronig relations were extended to the case of forward speed and cross-coupling, in the absence of negative damping. Some initial steps were taken in the direction of calculating Hi-Fi damping coefficients for heaving ellipsoids. The behaviour of damping coefficients at low frequency, for asymmetric motions, was investigated in its own right and in connection with the Hi-Fi method. It was shown that, with zero speed, the cross-coupling coefficients can be found from the wave amplitudes in the forced motion problems. Finally, some thought was given to a new kind of slender body theory for ship motions. (Author)

AD-427 843 Div. 9, 1, 30
OTS price $1.10

Kellett Aircraft Corp., Philadelphia, Pa.
EXPERIMENTAL INVESTIGATION TO DETERMINE THE INFLUENCE OF AIR-FRAME GEOMETRY IN ALLEVIATION OF OPERATIONAL PROBLEMS DUE TO DOWNWASH EFFECTS ON VTOL AIRCRAFT.

Descriptors: (*Celestial mechanics, Perturbation theory), (*Orbital trajectories, Numerical methods & procedures), N-body problem, Determination, Integration, Equations, Motion, Errors, Differential equations, Programming (Computers).

Commonly used numerical methods for orbit computation are compared. From the many methods available the following three were chosen: Cowell's method, Encke's method and the method of Variation of Parameters. Instead of comparing the methods against each other, with the attendant difficulty in deciding which of differing results is the more accurate, they were all compared with an exact solution of the problem of two fixed centers of gravitation. These three methods and the exact solution are described. The results of the comparison lead clearly to the conclusion that the Encke method is superior in all respects to the other two for a problem for which the classical two-body problem is locally a good approximation. For other problems, a modification of this method is indicated, rather than use of the Cowell method or the Variation of Parameters method. (Author)

AD-427 132 Div. 12
OTS price $7.60

Boeing Co., Seattle, Wash.
DESIGN HEATING DATA - PROTUBERANCE HEATING - WS-133B MINUTEMAN,
by R. H. Miller. 10 Aug 62, rev. 18 Sep 63, 1v.
Document no. 2 14137, vol. 2
Contract AF04 694 266
Unclassified report

Descriptors: (*Surfaces, Heating), (*Aircraft protuberances, Surfaces), Guided missiles (Surface to surface), Telemetering antennas, Bolted joints, Heat transfer coefficients, Data, Thermal insulation, Strategic weapons.

This document contains the following design data for the WS-133B Minuteman missile: (1) Design data for heating to protuberances and adjacent areas during in-flight and in-silo thermal environments. (2) Design criteria for fairing of insulation over small protuberances and mismatches to assure that local 'hot spots' do not occur. All data presented are for the in-flight aerodynamic heating environment unless otherwise noted. Data are presented for the operational missile as defined by Boeing drawing 25-40060, for the corresponding R&D configuration defined by Boeing drawing 25-37600, and for operational missiles with CTLI modifications as defined in this document. Heating to the missile exterior from the Stage II roll control jets and pressurization gas dump, the R&D Auxiliary Roll Control (ARC) system, and the Phase I retro-rockets are also presented. (Author)

AD-427 158 Div. 12, 30
OTS price $2.60

Mitre Corp., Bedford, Mass.
GENERAL ORBIT CHANGE OF AN EARTH SATELLITE BY A SINGLE IMPULSE,
by P. J. Plender. Dec 63, 26p. Rept. no. W6369
Contract AF19 628 2390, Proj. 600.1
ESD TDR63 481 Unclassified report

Descriptors: (*Satellites (Artifical), Transfer trajectories), Orbital trajectories, Celestial mechanics, Specific impulse, Velocity, Fuel consumption, Mathematical analysis, Programming (Computers), Numerical analysis, Feasibility studies, Maneuverability.

An analysis is presented of the mechanics and geometry of a general change in an earth satellite orbit caused by a single impulse. Typical numerical solutions of the resulting equations, carried out by a digital computer program, are given. (Author)

AD-427 190 Div. 12
OTS price $1.10

Martin Marietta Corp., Denver, Colo.
TITAN II ACCEPTANCE AND TURNOVER PROCEDURE SPECIFICATION.
15 Apr 63, 8p. Rept. no. CR61 306, rev. 1
Contract AF04 647 746
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Specifications), Quality control, Air Force, Acceptability.

AD-427 191 Div. 12
OTS price $3.60

Martin Marietta Corp., Denver, Colo.
TF-2 ACTIVATION EXERCISE PLAN.
Rev. 22 May 63, 1v. Rept. no. CR62 320 Rev. 1
Contract AF04 647 612
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Checkout procedures), Air Force, Visual inspection, Handling, Transportation, Launching sites, Guided missile components, Ground support equipment, Vapors, Checkout equipment, Silos, Military facilities, Air conditioning equipment, Communication systems, Hoists, Trailers, Test equipment, Maintenance equipment, Maintenance, Propellant tanks, Instrumentation, Guidance, Command and control systems, Electric cables, Guided missile computers, Instruction manuals, Destructors, Guided missile safety, Telemeter systems, Rocket motors, Storage.

AD-427 198 Div. 12
OTS price $1.10

Boeing Co., Seattle, Wash.
WS-133A SAFETY ANALYSES REPORTS VOLUME VII - FACILITIES AND REMOTE BASES.
rev. 16 Dec 63, 8p. Document no. D2 12298
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missile safety, Analysis), Guided missiles (Surface to surface), Test facilities, Handling, Transportation, Storage, Destructors, Launching sites, Maintenance, Maintenance equipment, Hazards, Military facilities, Air Force.

AD-427 210 Div. 12
OTS price $9.60

Boeing Co., Seattle, Wash.
MINUTEMAN, W-133A, WING II. FINAL GROUND TEST REPORT FTM 695,
by D. B. Webendorfer, H. R. Cushman, E. H. Kranz and E. G. Wickes. 12 Dec 63, 111p.
Contract AF04 647 757
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Checkout procedures), Processing, Tests, Test methods, Test vehicles, Human engineering, Military personnel, Training,

of the reaction of NOF and NO2F with the analytical equipment. Methods of analysis to identify the irradiation products are being developed. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

No Entries

12. GUIDED MISSILES

AD-427 048 Div. 12
OTS price $7.60

Boeing Pacific Test Center, Vandenberg, Air Force Base, Calif.
WS-133A. MONTHLY SUMMARY REPORT. WING II NUMBER 8. WINGS III-V NUMBER 3.
by L. W. McNeely. 15 Dec 63, 53p.
Contract AF04 647 757
Unclassified report

Descriptors: (*Guided missile (Surface-to-surface), Performance (Engineering)), Scheduling, Checkout procedures, Reports, Maintenance, Malfunctions, Strategic weapons.

This report is the test summary for the period 1-30 November 1963. It defines major test requirements, their degree of attainment, major program problems encountered and recommendations which may improve or accelerate the test program. It is not the purpose of this document to describe in detail each test performed, but rather, to report in general terms, the major test operations scheduled during the period, the major objective attained during the period, and to describe briefly, the manner in which the program has progressed. (Author)

AD-427 063 Div. 12
OTS price $4.60

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN). FACILITIES DESIGN CRITERIA, STRATEGIC MISSILE SUPPORT BASE, VANDENBERG AIR FORCE BASE,
by R. R. Cunningham. 31 Dec 63, 35p. Rept. no. MPO SR17 3 403
Contract AF04 694 261
Unclassified report

Descriptors: (*Ground support equipment, Design), (*Military facilities, Guided missiles (Surface-to-surface)), Launching sites, Design), Weapon systems, Electronic equipment, Maintenance.

This document in its final form will provide all necessary facilities criteria related to the Ground Electronics System (GES) requirements of the WS-133B Minuteman Weapon System, to accomplish the design of the SMSB for Vandenberg Air Force Base. Information to be provided for each facility will include area requirements, personnel requirements, environmental conditions, special architectural requirements, power, and other service requirements, interfaces, hold down requirements, etc. (Author)

AD-427 073 Div. 12
OTS price $8.10

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN). FACILITIES DESIGN CRITERIA, NEW OPERATIONAL LAUNCH AND LAUNCH CONTROL FACILITIES.
Rev. 1 Dec 63, 1v. Rept. no. MPO SR17 3 205, Rev.
Contract AF04 694 261
Unclassified report

Descriptors: (*Guided missile launchers, Ground support equipment), (*Ground support equipment, Guided missile launchers), Electronic equipment, Military facilities, Launching, Design, Control, Guided missile launchers, Installation, Guided missiles (Surface-to-surface), Antenna configurations, Batteries & components, Radio equipment, Filters (Electromagnetic wave), Checkout equipment, Motor generators, Power supplies, Electrical equipment, Communication equipment, Compressors, Pressurized cabins, Cooling, Telephone equipment, Modules (Electronic), Safety devices, Buildings.

Facilities design criteria, new operational launch and launch control facilities for the WS-133B (Minuteman) are discussed in this report.

AD-427 085 Div. 12
OTS price $8.10

Boeing Pacific Test Center, Vandenberg, Air Force Base, Calif.
MINUTEMAN WS-133A WING III. FINAL GROUND TEST REPORT. FTM 770.
1963, 88p.
Contract AF04 647 757
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Performance (Engineering)), Checkout procedures, Guided missile personnel, Human engineering, Safety, Training, Strategic weapons.

This report was prepared to provide a history of the receipt-thru-launch processing of Flight Test Missile (FTM) 770, and to provide results, conclusions, and recommendations developed from the test data. Test Operations and related activities are described in detail with special emphasis placed upon identification of Weapon System Deficiencies. (Author)

AD-427 091 Div. 12
OTS price $2.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT FOR FTM 445 EQUIPMENT COVERED BY THE FOLLOWING MODEL SPECS: S-133-1000-1-4, S-133-1000-1-5, S-133-1000-1-16, S-133-1000-1-17, S-133-1000-1-18, S-133-1000-1-19, S-133-1000-1-20,
by Carl J. Lesh. 30 Dec 63, 1v. Document no. D2 10889 2, vol. 65
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Specifications), Military requirements, Air Force, Tests, Quality control, Visual inspection, Guided missile components, Safety devices, Arming devices, Seperation, Explosive actuators.

AD-427 122 Div. 12, 15, 2
OTS price $5.60

Republic Aviation Corp., Farmingdale, N. Y.
COMPARISON OF SPECIAL PERTURBATION METHODS IN CELESTIAL MECHANICS,
by Samuel Pines, Mary Payne and Henry Wolf.
Aug 60, 48p.
Contract AF33 616 6449, Proj. 7041, Task 70435
ARL TR60 281 Unclassified report

UDMH/nitrogen tetroxide, hydrazine/nitrogen tetroxide, and RP-1/LOX. Each combination was used in a 1000-lb thrust model engine developed for the tests. Important parameters were varied over a wide range, primarily those of mixing ratios and different conditions of nitrogen purge. The objective was to produce high resolution spectra of small regions of the flame without the usual atmospheric absorption due to water vapor and carbon dioxide. A special test facility was established at the Lockheed Santa Cruz Test Base for spectral measurements, and a special model engine was developed to permit varying fuels and oxidizers. A nitrogen gas system was used to purge the spectrometer paths and to blanket the exhaust flame. The Perkin-Elmer 112 and other spectrometers, including the Block I-4 series were evaluated, but the P-E 112 was selected as the primary instrument. Ninety infrared emission spectra in the one-to-five-micron region were obtained and are published. Conversion of relative spectra to absolute radiance units is achieved by a novel technique using overlays. (Author)

AD-427 377 Div. 12
OTS price $1.60

Boeing Co., Seattle, Wash.
BUTTON-UP SECURITY SUBSYSTEM RELIABILITY ASSESSMENT. WING I. MINUTEMAN,
by L. Duvall. 19 Dec 63, 14p. Document no. D2 15685 1
Contract AF04 694 422
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface, Reliability), Design, Operation, Failure (Mechanics), Malfunctions, Guided missile components, Analysis, Data, Strategic weapons.

The text of this document is organized so as to compare Wing I BUSS operational reliability performance with its established requirements; to point out those areas of deficiency which have been detected; and to provide visibility on predicted reliability improvement as a result of proposed design changes. (Author)

AD-427 389 Div. 12
OTS price $1.10

Martin Marietta Corp., Denver, Colo.
POST FIRING CAPTIVE TEST REPORT. MISSILE SM68B-66. MISSILE VERIFICATION FIRING.
by H. W. Campbell. 1963, 4p. Rept. no. CR63 309
Unclassified report

Descriptors: (*Guided missiles (Surface-to surface), Firing test (Ordnance)), Air Force, Tests, Test methods, Test equipment, Torque, Performance (Engineering), Strategic Weapons.

This is a summary of Missile Verification Firing (MVF) of Missile B-66, performed by the Martin Company at Denver Test Stand D-2 in accordance with Test Directive CR-63-292, Rev. 1. (Author)

AD-427 562 Div. 12, 13
OTS price $2.60

Boeing Co., Seattle, Wash.
AMR MINUTEMAN SAFETY STANDARDS,
by J. E. Montagne and M. S. Thompson. 1 Oct 62, 21p. Document no. D2 3892, rev. B
Contracts AF04 694 266, AF04 647 289
Unclassified report

Descriptors: (*Guided missile safety, Standards), Instruction manuals, Guided missile ranges, Silos, Staging, Instrumentation, Launching sites, Handling, Solid rocket propellants, Rocket motors (Solid propellant), Transportation, Guided missle components, Flammability, Liquids, Electrical equipment, Vehicles, Test equipment, Storage.

AD-427 606 Div. 12
OTS price $4.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT FLIGHT TEST MISSILE 445, MODEL SPECIFICATION S-133-1007C.
by Carl J. Lesh. 30 Dec 63, 1v. Document no. D2 10889 1, vol. 65
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Military requirements), Specifications, Quality control, Visual inspection, Instrumentation, Electronic equipment, Guided missile components, Accelerometers, Telemeter systems, Electric cables, Filter (Electromagnetic wave), Electric switches, Voltage regulators, Test vehicles, Air Force.

These data identify and describe the actual status of End Items, designated for First Article Customer Inspection or Team Acceptance review (Reference: AFBSD Exhibits 61-51 and 61-30). It include any Waivers or Deviations that exist or are required for Non-Conformance Items. Status reporting will be at the delivery level unless otherwise noted. Responsibility of maintenance to include Base Commitments is transferred to the Base Quality Control Planning Unit receiving the equipment. (Author)

AD-427 653 Div. 12, 15, 2
OTS price $2.60

California U., Los Angeles.
A STUDY OF HIGH-PRECISION GEOCENTRIC AND INTERPLANETARY ORBITS.
Rept. for 2 Feb 59-30 Apr 63,
by Samuel Herrick. 30 Sep 63, 20p. Rept. no. 63 56
Contract AF49 638 498
AFOSR 5350 Unclassified report

Descriptors: (*Interplanetary trajectories, Orbital trajectories), Astronautics, Solar systems, Perturbation theory, Rendezvous trajectories, Optimization, Standardization, Programming (Computers).

The purpose of this contract is research into the theory and application of astrodynamics in the fields of high-precision geocentric and interplanetary orbits. Developing along these parallel lines, the undertaking has continually widened and deepened in scope since its inception to include such practical matters as the improvement of the numerical values of the astrodynamic constants, the computational advantages of various perturbation techniques, and use of universal variables, as well as theoretical development along the lines of optimization, rendezvous in space, and the adjoint method in differential orbit improvement. These are considered in the report. (Author)

AD-427 701 Div. 12, 25, 27
OTS price $22.25

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
TRANSACTIONS OF THE EIGHTH SYMPOSIUM ON BALLISTIC MISSILE AND SPACE TECHNOLOGY, HELD AT THE UNITED

Safety., Air transportation, Handling, Reentry vehicle, Guided missile components, Training devices, Instrumentation, Launching sites, Launching, Ground support equipment, Logistics, Test equipment, Air Force, Strategic weapons.

This report was prepared to provide a history of the receipt-through-launch processing of Flight Test Missile (FTM) 695, and to provide results, conclusions, and recommendations developed from the test data. Test Operations and related activities are described in detail with special emphasis placed upon identification of Weapon System Deficiencies. (Author)

AD-427 221 Div. 12
OTS price $19.75

Boeing Co., Seattle, Wash.
MINUTEMAN MONTHLY FAILURE SUMMARIES - DECEMBER, 1963.
8 Jan 64, 1v. Document no. D2 5286 47
Contracts AF04 694 107, AF04 647 289
Unclassified report

Descriptors: (*Guided missile components, Failure (Mechanics)), (*Failure (Mechanics), Guided missile components), Operation, Processing, Data, Electronic equipment.

AD-427 225 Div. 12
OTS price $1.60

RAND Corp., Santa Monica, Calif.
A CALCULATOR FOR SATELLITE GROUND TRACKS,
by F. S. Nyland. Dec 63, 7p. RM 3741 PR
Contract AF49 638 700
Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Handbooks, Circular orbit trajectories), (*Tracking, Templates), (*Satellites (Artificial), Tracking), Orbital trajectories, Mathematical prediction.

The graphical ground track calculator in this Memorandum is designed to provide quick approximations of the ground paths of satellites in circular or nearly circular orbits. Examples intended to demonstrate practical applications are included. There are template overlays for altitudes of about 300, 1800, and 3500 n mi, and each overlay has a correction chart to extend its altitude coverage both ways. For flights of many orbits, corrections can be made for some effects of the earth's oblateness. The results obtained by this calculator are approximate, especially when interpolations are made for orbital altitudes not indicated on the overlays. (Author)

AD-427 277 Div. 12, 20
OTS price $9.10

Boeing Co., Seattle, Wash.
OCTOBER, 1960, GODIVA III -- MINUTEMAN RADIATION EFFECTS TESTS,
by H. J. Lubatti and H. W. Wicklein. 12 Dec 60, 105p. Document no. T2 2128
Contract AF04 647 289
Unclassified report

Descriptors: (*Radiation damage, Electrolytic capacitors), Guided missiles (Surface-to-surface), Foils, Tantalum, Aluminum, Rectifiers, Gamma rays, Test equipment, Test method, Measurements, Dosimeters, Data, Tables, Electrical properties, Dose rate, Guided missile components.

Transient radiation effects tests on silicon controlled rectifiers, associated Minuteman circuits, and tantalum and aluminum electrolytic capacitors were performed at the Godiva III prompt critical assembly, Los Alamos, New Mexico, on Oct. 27 and 28, 1960. Fourteen out of 31 SCR's exhibited firing at gamma radiation rates between 6 x 10 to the 5th power and 3 x 10 to the 6th power r/sec. The gamma-induced SCR leakage current at firing generally exceeded twice the initial holding current of the device. A possible method for predicting gamma rates for firing SCR's is indicated. An empirical relationship for dependence of SCR leakage current on gamma rate was determined, as I sub c = (6 ± 3) x 10 to the minus 10 power and phi to the 1.2 plus or minus 0.1 power. Leakage resistance change factors as low as 3.6 x 10 to the minus 8 power and 2.6 x 10 to the minus 7 power for tantalum and aluminum electrolytic capacitors, respectively, were noted at gamma radiation rates up to 4.5 x 10 to the 7th power r/sec. A relationship between capacitor leakage resistance (R in ohms), capacitance (C in farads), and gamma radiation rate was determined at R = G/phi C, where C = 2.1 x 10 to the 5th power for aluminum foil capacitors, 3.29 x 10 to the 5th power for tantalum foil capacitors, and 1.81 x 10 to the 5th power for tantalum solid electrolyte capacitors. (Author)

AD-427 312 Div. 12
OTS price $1.10

Boeing Co., Seattle, Wash.
WS-133A SAFETY ANALYSES REPORT. VOLUME III. MISSILE-BORNE EQUIPMENT.
2 Mar 62, rev. 16 Dec 63, 2p. Document no. D2 12298, vol. 3
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missile components, Instrumentation), Guided missiles (Surface to surface), Air Force, Launching, Training devices, Guided missile safety, Flight testing, Strategic weapons.

Examination of the CTLI Kit and its usage indicates that there is no need for a detailed safety analysis since there is no system safety impact. (Author)

AD-427 373 Div. 12
OTS price $12.00

Lockheed Aircraft Corp., Sunnyvale, Calif.
MODEL ENGINE FLAME SPECTRAL STUDIES. SPECTRAL RADIANCE OF ROCKET PLUMES. VOLUME I.
Rept. for May 62-Aug 63,
by T. J. Kowall and R. C. Tuttle. Aug 63, 1v.
Rept. no. LMSC895304
Contract AF04 647 767
Unclassified report

Descriptors: (*Rocket motors, Rocket propellants), (*Exhaust flames, Spectra (Infrared)), Oxidizers, Measurement, Spark shadowgraph photography, Infrared spectrophotometers, Nitrogen, Interferometers, Data, Calibration, Recording systems, Detectors, Tetroxides, Infrared radiation.

Infrared spectral measurements were made on three combinations of rocket engine fuels and oxidizers:

Descriptors: (*Filters (Fluid), Carbon), Effectiveness, Water, pH, Temperature, Colors, Particle size.

A small carbon filter was investigated to determine the effectiveness of removing color from surface waters at remote Air Force radar sites in Alaska. The raw water was characterized by color ranging from 50 to 90 units, pH near 6, temperature 5 Celsius, and low turbidity. When using carbon with a particle size high enough to provide low pressure losses, the color removed was less than 50%. With powdered activated carbon, pressure losses and carbon carryover caused the system to be considered unacceptable even though color removal was high. (Author)

AD-427 176 Div. 13, 27
OTS price $2.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
INVESTIGATION OF FINNED REAR WALL TUBE ARRANGEMENT FOR BOILER FURNACE,
by W. Ferraris, R. Schell and R. Ness. Nov 63, 5p.
NBTL B505A
Unclassified report

Descriptors: (*Boilers, Pipes), (*Boiler tubes, Fins), Refractory materials, Surface temperatures, Tests, Temperature, Instrumentation, Thermocouples, Structural parts, Frigates, Heat exchangers, Furnaces.

Rear wall refractory behind nontangent tubes cannot be expected to hold up as well as that behind tangent tube side walls. Because of a relatively short life period (about five years of service) and because of the difficulty involved in replacing rear wall refractory, fins were installed on the rear wall of a DLG-6 Class test boiler to determine their effectiveness in reducing rear wall refractory temperatures. As a result of finning the rear wall tubes, the average surface temperature of the rear wall refractory was reduced by 630 F, and the heat transfer or circulation of the boiler was not adversely affected. Because of the method of installation used, fin life was relatively short; and the test was terminated before it could be established whether refractory deterioration was retarded or completely eliminated. (Author)

AD-427 616 Div. 13, 20
OTS price $19.75

Newmark, Hansen and Associates, Urbana, Ill.
DESIGN OF OPENINGS FOR BURIED SHELTERS,
by Nathan M. Newmark. July 63, 1v. Rept. no. 2 67
Contract DA22 079eng225
Unclassified report

Descriptors: (*Underground structures, Design), Shelters, Radiation hazards, Shielding, Radiation effects, Pressure, Blast, Soil mechanics, Dose rate, Structural properties, Aluminum, Steel.

For neutrons normally incident on a shelter doorway, the presence of an aluminum blast door of reasonable thickness will not greatly vary the hazard inside the shelter from that which would result if no door were present. When the neutrons are incident at such an angle that the direct beam would not penetrate appreciably into the shelter, the presence of an aluminum door would indeed create a greater radiation field within the shelter. However, the aluminum door would create no greater hazard than a steel door of comparable strength; on the contrary the former would probably create less hazard. (Author)

AD-427 820 Div. 13, 16
OTS price $11.50

United Research Services, Burlingame, Calif.
A STUDY OF THE DYNAMIC SOIL-STRUCTURE INTERACTION CHARACTERISTICS OF REAL SOIL MEDIA.
Final rept. 1 Aug 62-1 Aug 63,
by H. G. Mason, O. H. Criner, R. Waissar, and N. R. Wallace. Dec 63, 153p.
Contract AF29 601 5537, Proj. 1080, Task 108003
RTD TDR63 3075 Unclassified report

Descriptors: (*Soils, Ecology), Mathematical analysis, Theory, Stresses, Mechanical properties, Test facilities, Test methods, Wave transmission, Tables, Nonlinear systems, Models (Simulations).

An experimental and theoretical study of the dynamic soil-structure interaction characteristics of real soil media is presented. An extensive list of the more important references obtained from a literature search is included. Basic concepts of passive and active arching phases of soil-structure interaction, including equations representing static behavior, are presented. The experimental program consisted of a study of the soil-structure interaction on small, idealized, cylindrical structures buried in a sand medium subjected to dynamic loads. Test data obtained indicate that very large overstresses are produced by passive arching. The data also show that overstress due to interaction is dependent upon depth, stress level, relative density of soil, length-to-span ratio, and the compressibility of the structure. The theoretical program consisted of an investigation of the dynamic response of a simple cubic packing of spheres for waves of low stress levels. Certain boundary value problems, representative of phases of soil-structure interaction, were reduced to a form for numerical evaluation. (Author)

14. MATERIALS (NON-METALLIC)

AD-427 009 Div. 14
OTS price $1.60

IIT Research Inst., Chicago, Ill.
AN INVESTIGATION OF MATERIAL PARAMETERS INFLUENCING CREEP AND FATIGUE LIFE IN FILAMENT WOUND LAMINATES.
Quarterly rept. no. 7, 26 Aug-26 Nov 63,
by R. H. Cornish, H. R. Nelson and B. W. Abbott. Dec 63, 10p. Rept. no. 21
Contract NObs86461, Proj. SF013 05 03, Task 1025
Unclassified report

Descriptors: (*Filament wound construction, Mechanical properties), (*Laminates, Composite materials), Reinforcing materials, Glass textiles, Plastics, Moisture, Sheets, Cylindrical bodies, Compressive properties, Fatigue (Mechanics), Creep, Stresses, Rupture, Test methods, Test equipment, Submarine hulls, Pressure vessels.

Progress is reported in five different areas which include: Phase I - specimen preparation and test fixture modification; Phase II - specimen procurement and characterization, biaxial compression and fatigue experiments, and biaxial creep-stress rupture tests. Cumulative progress in each of these areas is delineated. (Author)

STATES NAVAL TRAINING CENTER SAN DIEGO, CALIFORNIA ON 16-18 OCTOBER 1963. VOLUME II. RE-ENTRY AEROPHYSICS PENETRATION GUIDANCE AND CONTROL RECOVERY SYSTEMS SPACE ELECTROMAGNETICS.
1963, 420p.
Unclassified report

In cooperation with Aerospace Corp., Los Angeles, Calif.

Descriptors: (*Atmosphere entry, Symposia), (*Reentry vehicles, Multiple operation), Explosives initiators, Manned spacecraft, Microwave amplifiers, Nose cones, Plasma sheath, Boundary layer, Slender bodies, Laminar boundary layer, Hypersonic characteristics, Wake, Radar echo areas, Electromagnetic waves, Propagation, Microwaves, Penetration, Descent trajectories, Antisatellite defense systems, Satellite attitude, Inertial guidance systems, Satellites (Artificial), Attitude control systems, Accelerometers, Orbital trajectories, Radiation hazards, Errors, Ribbon parachutes, Recovery, Mars, Parawings, Recoverable boosters, Resonance scattering.

Contents: Re-entry Aerophysics; Penetration; Guidance and Control; Recovery Systems; Space Electromagnetics.

AD-427 741 Div. 12. 8, 19
OTS price $2.00

Kearfott Div., General Precision Inc., Little Falls, N. J.
THE BEVELOPMENT OF A DIGITAL ANGULAR ACCELEROMETER.
Final technical rept.
Dec 63, 71p.
Contract AF33 616 8452; Proj. 4431; Task 443125
ASD TDR63 838 Unclassified report

Descriptors: (*Accelerometers, Satellites (Artifical)), Spacecraft, Inverted guidance, Instrumentation, Feasibility studies, Design, Mercury, Transductors, Pulse generators, Digital systems, Torque, Measurement, Performance (Engineering), Electronic equipment, Circuits.

The integrating angular accelerometer described herein is of unique design and provides digital readouts. The complete absence of mechanical parts in its sensing element makes it suitable for operation under a high-acceleration environment. Its advantages and disadvantages, as well as its actual and potential performance are discussed and compared with those of a high-accuracy gyro. The effect of size and weight of the sensing element on signal threshold values as well as the performance limits imposed by the present state of the art of DC signal amplification are investigated. A detailed analysis of transducer, electrical-circuit, and digitalization errors is given and ways and means of reducing them are outlined. (Author)

AD-427 827 Div. 12, 6
OTS price $5.60

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
AIRBORNE INSTRUMENTATION PLATFORM FEASIBILITY STUDY RESULTS.
Jan 64, 1v.
ESD TDR64 182 Unclassified report

Descriptors: (*Spacecraft, Tracking), (*Tracking, Airborne), Telemeter systems, Aircraft, S-band, Radar equipment, Radar tracking, Satellites (Artificial), Trajectories, Optical tracking, Communication systems, Navigation, Data processing systems, Orbital trajectories, Instrumentation, Shipborne, Performance (Engineering), Feasibility studies, Costs, Errors, Lunar probes, Manned spacecraft.

The results of a feasibility study to determine the utility of an Airborne Instrumentation Platform for making tracking measurements on satellite and spacecraft trajectories are presented. This report considers an analysis of the capability of a system, to be developed through the integration of state-of-the-art sensor (radar and optical), communication, navigation, data processing and telemetry equipment, to satisfy the tracking measurement requirements of typical orbital profiles. (Author)

AD-427 866 Div. 12, 8, 30
OTS price $6.60

Northrop Corp., Hawthorne, Calif.
TERMINAL GUIDANCE SIMULATOR STUDY PROGRAM IMAGE EVALUATION. VOLUME II. RESULTS OF EXPERIMENT, by B. L. Cole, R. W. Van Loone, N. F. Richards and A. Linge. Jan 64, 64p. Rept. no. NOR64 10
Contract Nonr364800
Unclassified report

Descriptors: (*Simulation, Terminal guidance), (*Guided missile simulators, Television equipment), (*Images, Analysis), Television equipment, Photographic images, Microminiaturization (Electronics), Densimeters, Signal-to-noise ratio, Photometers, Optical equipment, Analog computers, Electron optics, Television cameras, Video signals, Density, Performance (Engineering), Measurement, Calibration, Theory, Design, Filters (Electromagnetic wave).

This report consists of two volumes. Volume I covers a discussion on the theory of image formation, and an application is made to television imaging systems. Volume II covers the results of the image evaluation experiment conducted as a part of ONR Contract Nonr364800. The purpose of this report is to provide objective methods of assessing characteristics of optical systems as opposed to the usual subjective approach. The objective characteristics considered were transfer characteristic, the sine wave response, and the signal-to-deviation ratio. However, in the final analysis, any valid objective estimate of image quality will have to pass the test of correlation with subjective impressions in future experiments. As a result of the image evaluation experiment and associated studies conducted under this contract, methods are now available to assess the characteristics of imaging systems prior to design. A common language is provided to describe the performance of elements in an optical system so that the complete system can be designed from the characteristics of the constituent elements. In order to effectively use the techniques developed, the requirements and the environment in which the system is to be used must be well defined. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-427 168 Div. 13
OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
COLOR REMOVAL FROM SURFACE WATERS BY CARBON FILTER,
by D. J. Baumgartner. Oct 63, 5p.
Project 8246 1
AAL TDR62 37 Unclassified report

temperature attachment and the a sub o's and c sub o's of lampblack base, hot worked coke base, and pyrolytic graphite were evaluated at 6, 78 and 298 K. The three graphites showed similar expansion characteristics and, within the limits of error, seemed to show a negative a sub o expansion coefficient near 298 K. (Author)

AD-427 228 Div. 14, 1, 31
OTS price $1.60

Naval Research Lab., Washington, D.C.
FEASIBILITY OF UTILIZING LUMINESCENT AND REFLECTIVE COATINGS AS VISUAL AIDS FOR NIGHT CARRIER LANDINGS,
by Gerald E. Rohl and Jack E. Cowling.
15 Oct 63, 15p.
NRL 5973 Unclassified report

Original contains color plates: all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Night landings, Landing aids), (*Landing aids, Fluorescence), (*Carrier landings, Landing aids), (*Fluorescence, Landing aids), (*Coatings, Reflection), (*Luminescence, Coatings), Paints, illumination, Naval research, Markers, Effectiveness, Feasibility studies, Model tests.

The introduction of high-speed aircraft coupled with around-the-clock, all-weather operations of the Navy's fleet air arm have introduced hazards in landings aboard carriers which hitherto were not encountered. The U.S. Naval Research Laboratory has conducted studies to determine the technical feasibility of using fluorescent materials as visual aids for night operations aboard aircraft carriers. These studies included small-scale tests on models and intermediate-scale tests (About 1/4 scale) in a hangar. In each type of test fluorescence was induced by two methods: (1) direct illumination of the surface by near ultraviolet or visible red and blue energy and (2) indirect illumination by white light of the under surface of a fluorescent paint applied to a clear plastic bar. The latter of these two methods appears to be technically feasible, and it is recommended that a full-scale evaluation be made. The high level of lighting required by the first method would seem to preclude its use for actual application aboard ship. (Author)

AD-427 288 Div. 14, 15
OTS price $7.60

Electronic Properties Information Center, Culver City, Calif.
ZINC SULFIDE, DATA SHEETS,
by M. Neuberger and D. L. Grigsby. Dec 63, 72p.
Rept. no. DS135
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Semiconductors, Zinc compounds), (*Zinc compounds, Sulfides), Data, Electrical properties, Crystal structure, Absorption, Dielectric properties, Electrical conductance, Resistance (Electrical), Atomic energy levels, Luminescence, Magnetic properties, Optical properties, Hall effect, Photoelectric effect, Electroluminescence, Piezoelectric effect, Reflection, Refractive index.

AD-427 316 Div. 14, 25
OTS price $1.50

Union Carbide Consumer Products, Co., Parma, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME XLI SURVEY AND ANALYTICAL REPRESENTATION OF THE MEASUREMENTS OF THE SPECIFIC HEAT OF GRAPHITE,
by G. B. Spence. Nov 63, 42p.
Contract AF33 616 6915; Projs. 7350; 7381, Tasks 735002; 738102
WADD TR61 74, Vol. 41 Unclassified report

Report on Refractory Inorganic Non-metallic Materials.

Descriptors: (*Graphite, Specific heat), (*Reviews, Specific heat), High-temperature research, Crystal lattices, Statistical analysis, Cryogenics, Bibliographies, Distribution, Pyrolytic graphite, Thermal expansion.

A literature survey was made of the experimental values of the specific heat of graphite. Most of the measurements from 20 K to 3800 K were reanalyzed and a new average curve is given for each experimental run. Some of the new curves are significantly different from the original curves. Estimates are given of the Cp-Cv term, the electronic specific heat, and the specific heat of the lattice vibrations. The lattice specific heat was approximated by various combinations of Einstein and one-and two-dimensional Debye functions. The characteristic temperatures were selected by a least-squares curve-fitting procedure. (Author)

AD-427 342 Div. 14, 13
OTS price $.75

Army Engineer Research and Development Labs., Fort Belvoir, Va.
PLASTIC FIBROUS REINFORCEMENT FOR PORTLAND CEMENT,
by S. Goldfein. 29 Oct 63, 16p.
Task 1D024401A11402
AERDL TR1757TR Unclassified report

Descriptors: (*Concrete, Reinforcing materials), (*Reinforcing materials, Textiles), Fibers (Natural), Fibers (Synthetic), Glass textiles, Cotton textiles, Dacron, Nylon, Orlon, Rayon, Polyethylene plastics, Vinyl plastics, Wire, Steel, Reinforced concrete, Impact shock, Shock resistance.

An investigation was made to determine methods for increasing the impact and shatter resistance of portland cement. Conclusions were that (1) all fibers investigated increased the impact strength of cement; (2) nylon, polypropylene, polethylene, and Saran imparted the greatest strength to cement, in the order listed; (3) nylon imparted the greatest impact strength of all the fibers investigated, since it was 83% by weight and 36% by volume stronger than its closest competitor, polypropylene, (4) nylon introduced into cement under optimum conditions increased the Izod impact strength more than 27 times that of the unreinforced cement; (5) fibers such as cotton, rayon acetate, Orlon, glass, and Dacron imparted little strength to the cement, because they were degraded by the high alkalinity in the cement; and (6) steel wires increased the flexural strength of cement and also increased its shatter resistance, but they did not impart the resilience which nylon provided. (Author)

AD-427 346 Div. 14
OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
STRUCTURAL CHANGES IN PYROLYTIC GRAPHITE AT ELEVATED TEMPERATURES,
by J. H. Richardson and E. H. Zehms. 1 Dec 63,

AD-427 056 Div. 14, 17
OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
INVESTIGATION OF BONDING IN OXIDE-FIBER (WHISKER) REINFORCED METALS.
Quarterly rept. no. 5, 1 July-30 Sep 63,
by Willard H. Sutton. 30 Sep 63, 33p.
Contract DA36 034ORD3768, Proj. 1H0 24401A11
AMRA TR CR63 01 5 Unclassified report

Descriptors: (*Composite materials, Bonding), (*Ceramic fibers, Reinforcing materials), (*Nickel alloys, Surface properties), Aluminum compounds, Oxides, Nickel, Aluminum alloys, Copper alloys, Indium alloys, Titanium alloys, Zirconium alloys, Chromium alloys, Metals, High temperature research, Low pressure research, Drops, Adhesion, Single crystals, Sapphires, Surface active substances, Solid solutions, Photomicrography, Thermochemistry.

Special binary alloys of pure Ni containing 1 at.-% of Al, Cu, In, Ti, Zr and Cr were prepared and were used in sessile drop experiments, which were conducted at temperatures ranging between 1460 and 1510 C and at pressures of 5 x 10 to the -5th power Torr. It was found that the additions of Al, Cu, and In had little effect in lowering the contact angle between pure Ni and single crystal substrates of alpha-Al2O3. However, the Ti, Zr and Cr additions, which reacted chemically with the substrate, lowered the contact angle significantly. Future studies are planned which will study the effect of interfacial reactions on the bond strength between the Ni/Ni alloys and alpha-Al2O3. (Author)

AD-427 104 Div. 14, 25
OTS price $7.60

Carbon Research Lab., U. of Buffalo, N. Y.
INVESTIGATION OF ELASTIC AND THERMAL PROPERTIES OF CARBON-BASE BODIES.
Rept. for Feb 62-Aug 63,
by S. Mrozowski, J. F. Andrew, N. Juul, S. Sato and H. E. Strauss. Oct 63, 68p.
Contract AF33 616 7791, Proj. 7350, Task 735002
WADC TR58 360, pt. 5 Unclassified report

Descriptors: (*Carbon, Elasticity), (*Graphite, Thermal conductivity), Thermal diffusion, Heat treatment, Resistance (Electrical), Internal friction, Neutron beams, Strain (Mechanics), Pyrolytic graphite, Rods, Graphited materials, High-temperature research, Cryostats, Crystals, Cryogenics.

In continuation of the work on elastic properties of carbons, using the greatly improved high temperature equipment, families of curves of the dependence of Young's modulus on temperature and on the heat treatment have been obtained for four basic types of carbons and as far as possible, for a number of special types of commercial carbons. The amplitude dependence of internal friction and dynamic Young's modulus were investigated in the sonic range for a number of types of carbons as made and also neutron irradiated, as well as the temperature dependence of internal friction of the resonance frequency from room down to liquid hydrogen temperature. The presence of a Bordoni peak at 50 K has been found connected with the relaxation of motion of dislocations. Families of curves of the dependence of heat conductivity and electric resistivity on temperature and on the heat treatment have been obtained for four basic types of carbons, using an improved technique. The ''steady'' sinusoidal wave technique for determination of heat diffusivity has been improved in precision and extended in temperature range and data collected for several types of graphitized materials. (Author)

AD-427 177 Div. 14, 30
OTS price $1.25

Carbon Products Div., Union Carbide Corp., Lawrenceburg, Tenn.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME XXII-PHOTOMICROGRAPHIC TECHNIQUES FOR CARBON AND GRAPHITE,
by G. L. Peters and H. D. Shade. Nov 63, 35p
Contract AF33 616 6915, Projs. 7350, 7381; Tasks 735002, 738102
WADD TR61 72, Vol. 22 Unclassified report

Descriptors: (*Carbon, Microstructure), (*Graphite, Microstructure), (*Photomicrography, Microstructure), (*Microstructure, Carbon), Pyrolytic graphite, Illumination, Grinding wheels, Surface properties, Porous materials, Ceramic coatings, Diamond wheels.

Photomicrographic techniques were used to examine the microstructure of many grades of carbon and graphite. These techniques have aided in the study of these grades and in predicting or understanding their behavior in various applications. Photomicrography has allowed identification of various materials such as cokes, graphites, pitch, within the formed article and has permitted a study of the distribution of these materials. The effect of impregnation of the graphite with pitches and resins can be more clearly defined by careful photomicrographic examination. Standard metallographic equipment can be used for such studies but preparation of the carbon and graphite requires special techniques. Mounting methods to prevent smearing or chipping of the samples during preparation and to obtain highly polished surfaces are discussed. Also described are various techniques of lighting to aid in revealing and interpreting microstructure, and different types of photographic film, plates, developers and printing papers required for showing pertinent details in the final photomicrograph. (Author)

AD-427 185 Div. 14, 25
OTS price $.50

National Carbon Co. Inc., Cleveland, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME XXIV - THE THERMAL EXPANSION OF GRAPHITE IN THE C SUB o-DIRECTION,
by C. E. Lowell. Nov 63, 12p.
Contract AF33 616 6915, Projs. 7350, 7381; Tasks 735002, 738102
WADD TR61 72 vol. 24
Unclassified report

Report on Refractory Inorganic Non-Metallic Materials and Materials Applications.

Descriptors: (*Graphite, Thermal expansion), (*Pyrolytic graphite, Thermal expansion), X-ray photography, High-temperature research, X-ray diffraction cameras, Cryogenics, Crystal lattices.

The thermal expansions of lampblack base, coke base, hot worked coke base and pyrolytic graphites have been measured in the c sub o direction from 1000 to 2700 K by use of a high temperature X-ray camera. The results indicate that, (a) the coefficient of thermal expansion is not constant with temperature and (b) this coefficient increases with increasing crystallite perfection. The camera was modified to accept a low

(2) ethylene disulfide and ethyl formal disulfide, and (3) ethylene disulfide and alpha paraxylene disulfide. Master stress relaxation curves were constructed for poly(ethyl formal disulfide), poly(paraxylene disulfide) and poly(ethylene tetrasulfide) and show a marked resemblance to those obtained for amorphous hydrocarbon polymers. (Author)

15. MATHEMATICS

AD-427 018 Div. 15, 30, 8, 2
OTS price $7.60

Stanford Research Inst., Menlo Park, Calif.
FUNCTION MODELING EXPERIMENTS.
Technical rept.,
by R. O. Duda, J. W. Machanik and R. C. Singleton. Dec 63, 67p.
Contract Nonr343800, SRI Proj. 3605
Unclassified report

Descriptors: (*Teaching machines, Computer logic), (*Artificial intelligence, Functions), Statistical analysis, Numerical analysis, Sampling, Statistical data, Statistical functions, Networks, Inequalities, Mathematical prediction, Pattern recognition, Special-purpose computers.

The results of an experimental investigation of the capabilities and the limitations of trainable machines for use in function modeling have been presented. In the simpler experiments the data used for training were noise-free. Here the structure of the machine set the fundamental limitation on the possible performance. In the prediction experiments, random fluctuations in the data also limited performance. Modified training rules, which have not yet been theoretically justified, were developed to cope with the second limitation. Elementary functions were approximated in many of the function modeling experiments; for these functions, the use of a learning machine instead of more conventional methods cannot be justified. However, for more difficult applications, such as those encountered in the prediction experiments, the machine performance was sufficiently good to make the speed advantages of a training machine a significant consideration. Viewed as a statistical procedure, this technique is essentially a non-parametric procedure that can be efficiently performed by a special-purpose computer of the type currently being constructed for pattern recognition problems. (Author)

AD-427 076 Div. 15
OTS price $1.60

Coordinated Science Lab., U. of Illinois, Urbana
THE EULER-POISSON EQUATION AND OPTIMAL LINEAR CONTROL,
by R. A. Rohrer and M. Sobral. July 63, 15p.
Rept. no. R176,
Contract DA36 039TR US AMC 02208, Proj. 3A99 25 004
Unclassified report

Descriptors: (*Partial differential equations, Calculus of variations), Optimization, Control, Performance (Engineering), Operations research, Linear systems, Feedback.

The calculus of variation is applied to the problem of finding the optimum control for a completely controllable nth order stationary linear system with quadratic performance index. A simple procedure, which involves only factoring a 2nth order even polynomial into a product of anti-Hurwitz and Hurwitz polynomials, emerges from the first variation. Moreover, an easily performed test for the sufficiency of such solutions as optimal is obtained from the second variation. Conditions under which the closed loop system is stable for the optimum control law are discussed. The examples illuminate the versatility of such an approach - among them being an application to the problem of obtaining singular solutions when the cost of control does not enter into the performance index. (Author)

AD-427 077 Div. 15, 30
OTS price $2.60

Coordinated Science Lab., U. of Illinois, Urbana.
THE PARAMETER VARIATION PROBLEM IN STATE FEEDBACK CONTROL SYSTEMS,
by W. R. Perkins and J. B. Cruz, Jr. Oct 63, 19p.
Rept. no. R182
Contract DA36 039AMC02208, Proj. 3A99 25 004
Unclassified report

Descriptors: (*Linear systems, Sensitivity), Differential equations, Control, Performance (Engineering), Matrix algebra, Feedback.

The plant parameter variation problem in multivariable linear systems described by state vector equations is formulated using a new sensitivity measure. This formulation involves a direct comparison of open-loop and state feedback performance in the presence of parameter variations, and provides a basis for guaranteeing the superiority of the feedback design. Results are obtained for both continuous and discrete multi-input multi-output systems. Furthermore, it is shown for single-input multi-output plants that a low sensitivity design is also an optimal feedback control design with respect to a quadratic performance index. This provides a new interpretation of a similar result previously obtained by Kalman. (Author)

AD-427 111 Div. 15, 6
OTS price $2.60

Radio Corp. of America, Burlington, Mass.
INVESTIGATION OF THE APPLICATION OF STOCHASTIC SWITCHING TECHNIQUES TO THE ECCM PROBLEM,
by Howard E. Etter and Fred J. Morin. Oct 63, 18p.
Contract AF19 604 8859
ESD TDR63 186 Unclassified report

Descriptors: (*Artificial intelligence, Special purpose computer), Bionics, Teaching machines, Pattern recognition, Cybernetics, Networks, Nervous system, Brain, Reflexes, Perception, Speech, Vision, Switching circuits.

Three stochastic devices previously developed by the Control Sciences Laboratory were investigated to determine their applicability to the ECCM problem. Lacking a clear cut application some consideration was given to other possible uses. Additional information was gathered from the literature relative to the general field of stochastic and adaptive devices. (Author)

AD-427 304 Div. 15, 30
OTS price $3.60

Boeing Scientific Research Labs., Seattle, Wash.
ON THE EVALUATION OF THE JACOBIAN ELLIPTIC AND RELATED FUNCTIONS,
by Thomas H. Southard. Nov 63, 32p. Rept. no. D1 82 0313
Unclassified report

Also available from the author.

23p. Rept. no. TDR269 4240 10 3
Contract AF04 695 269
SSD TDR63 340 Unclassified report

Descriptors: (*Pyrolytic graphite, Heat shields), (*Heat shields, Reentry vehicles), (*Thermal conductivity, Pyrolytic graphite), (*Thermal insulation, Pyrolytic graphite), Ablation, Erosion, Rocket motor nozzles, Instrumentation, Furnaces, Heat treatment, High-temperature research, X-ray diffraction analysis, Thermal expansion, Pyrometers, Anisotropy, Emissivity, Crystal structure, Thermal stresses, Creep, Irreversible processes.

Gross and unit cell dimensional changes of pyrolytic graphite were measured as a function of heat-treatment times between 15 seconds and 10 minutes at temperatures from 2600 to 3000 C. These changes were also measured for 4-hour heat treatments in the same temperature range. No incubation period for these changes was noted above 2600 C. The effects of these changes in rocket nozzle and reentry configurations are discussed. (Author)

AD-427 370 Div. 14, 13
OTS price $1.10

Princeton U., N. J.
INVESTIGATION OF GLASS FIBERS AS REINFORCEMENT FOR PRESTRESSING CONCRETE.
Final rept.,
by Norman J. Sollenberger. 9 July 63, 6p.
Contract NBy8996
Unclassified report

Descriptors: (*Reinforced concrete, Reinforcing materials), (*Reinforcing materials, Glass textiles), Concrete, Rods, Tensile properties, Stresses, Scientific research, Indexes, Reviews.

The following conclusions were reached: (1) fiber glass rods do not show promise for use as tendons for post-tensioning concrete structures; (2) fiber glass rods do show promise for use as tendons for pre-tensioning concrete structures by bonding the rods to the concrete; (3) fiber glass rods having an ultimate strength in excess of 200,000 psi. based on gross cross-sectional area and a safe working stress of approximately 100,000 psi. can be fabricated; and (4) fiber glass rods show definite promise of resisting unusual corrosion conditions but exposure tests will be necessary. (Author)

AD-427 568 Div. 14, 13
OTS price $8.10

Oregon State U., Corvallis.
AIRCRAFT WASHRACK WASTES, THEIR CHARACTERISTICS AND TREATMENT,
by David Roland Evans. June 64, 77p.
Unclassified report

Master's Thesis.

Descriptors: (*Aircraft, Maintenance), (*Cleaning compounds, Disposal), (*Wastes (Sanitary engineering), Sewage), (*Water supplies, Contamination), Surface active substances, Paint removers.

A study of aircraft washrack waste characteristics and treatment methods is presented. The first section reviews available literature including past experimental analysis. The second section surveys current washrack installations and treatment facilities at 65 Air Force bases in the United States. The final section contains an experimental analysis of the washrack wastes and the treatment facility at Portland AFB, Oregon. Oil concentration, five-day BOD., suspended solids, total solids, and effluent over-flow are used to measure the waste characteristics and flow and to determine the efficiency of a gravity oil separator at the Portland base. A testing procedure for determining oil concentrations is developed. (Author)

AD-427 722 Div. 14, 12
OTS price $10.50

Georgia Inst. of Tech., Engineering Experiment Station, Atlanta.
CERAMIC SYSTEMS FOR MISSILE STRUCTURAL APPLICATIONS.
Summary rept. no. 1 and quarterly rept. no. 4, 1 Nov 62-31 Oct 63.
31 Oct 63, 129p.
Contract NOw63 0143d
Unclassified report

Descriptors: (*Ceramic materials, Structural parts), (*Radomes, Ceramic materials), Silicon compounds, Dioxides, Refractory materials, Material forming, Casting, Surfaces, Melting, Plasma jets, Raindrops, Erosion, Test equipment, Rocket propelled sleds, Ceramic fibers, Fibers (Natural), Wood, Aluminum compounds, Oxides, Clay, Nose cones, Aerodynamic configuration, Zirconium compounds, High temperature research, Porous materials, Spacecraft.

Rocket sled rain erosion and impact evaluation indicated that slip-cast fused silica radomes can satisfactorily survive severe rain erosion environments. Techniques for flame glazing (surface melting) slip-cast fused silica were successful using a high enthalpy arc-plasma flame and an oxyacetylene flame. The effect of NiO, MnO, Co_3O_4, V_2O_5, and Cr_2O_3 additions to fused silica slip on its thermal properties was studied. Felted ceramics techniques were investigated for developing highly refractory structures for hyperthermal applications. Preliminary work was conducted to establish feasibility of forming high temperature resistant felted ceramics. Basically, the felted ceramic process is a modified paper making process. The wood fibers or other organic fibers are used for particulate oxide retention in forming the felt and are subsequently burned out leaving a continuous porosity ceramic structure. (Author)

AD-427 849 Div. 14
OTS price $2.60

Frick Chemical Lab., Princeton U., N. J.
VISCOELASTIC PROPERTIES OF SOME ALKYL DISULFIDE COPOLYMERS,
by W. J. MacKnight, M. Takahashi, and A. V. Tobolsky. Dec 63, 19p. Technical rept. no. RLT67
Contract Nonr185807, Proj. NR356 377
Unclassified report

Descriptors: (*Polymers, Viscoelasticity), (*Organic sulfur compounds, Polymers), Sulfides, Ethers, Transition temperature, Copolymerization, Aromatic compounds, Stresses, Synthetic rubber, Elastomers, Crystallization, Synthesis (Chemistry), Aliphatic compounds, Chlorine compounds, Sodium compounds, Mechanical properties, Torsion meters, Shear stresses.

Modulus-temperature data, modulus-time data and glass transition temperatures have been obtained for the following copolymer systems: (1) ethylene disulfide and ethyl ether disulfide,

in core storage. The reason is that Gauss's method is applied in a more subtle fashion in which successive columns of the reduced system are obtained rather than successive rows. (Author)

AD-427 775 Div. 15, 30
OTS price $3.00

Adaptronics Inc., Alexandria, Va.
THEORY OF PROBABILITY STATE VARIABLE SYSTEMS. VOLUME IV: MATHEMATICS OF GENOTYPES AND GENERALIZED LEARNING-MACHINES,
by R. J. Lee. Dec 63, 159p.
Contract AF33 657 7100; Proj. 4160; Task 416004
ASD TDR63 664 Unclassified report

Descriptors: (*Teaching machines, Mathematical analysis), (*Artificial intelligence, Networks) Learning, Probability, Computers, Control systems, Cybernetics, Communication theory, Neuroses, Reasoning.

A study of mathematical techniques for representing the behavior of genotype probability state variable (PSV) systems is described. This involves calculations of the probabilities of having output signals as a result of given input signals, using networks of statistically joined PSV devices for which the detailed connections are unknown. We will consider various fundamental aspects of generalized learning-machine theory, and analog as well as digital functions. The relationship of PSV devices to the general problem of machine intelligence is discussed. (Author)

AD-427 802 Div. 15
OTS price $1.60

George Washington U., Washington, D. C.
FACTORIAL DISTRIBUTIONS,
by W. H. Marlow. 14 Jan 64, 13p. Rept. no. T167
Contract Nonr761, Projs. NR345 107, NR047 001
Unclassified report

Descriptors: (*Probability, Statistical distributions), Series, Taylor's series, Special functions.

Certain infinite series regarded as a family of discrete probability distrubutions are described. The approach is a 'most general' formulation based on factorial power functions. A theorem shows that the distributions form a two parameter family. Several corollaries show that the family is highly tractable, particularly in closed form expressions which exist not only for individual and cumulative probabilities but for various expectations as well. The family is also shown to be distinguished by, that corresponding to each value r = 0, 1, 2, ... there is a member distribution possessing its r-th moment but whose (r + 1) - st moment fails to exist. (Author)

AD-427 882 Div. 15
OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
NEW METHODS OF SOLVING ALGEBRAIC EQUATIONS,
by Kurt H. Haase. Dec 63, 43p.
Proj. 5628
AFCRL 63 560 Unclassified report

Descriptors: (*Equations, Polynomials), Algebra, Numerical analysis.

The main problem of solving an algebraic equation which is of higher degree is that of factorizing the polynomial in a product of polynomial factors of Degrees 1 and 2. A class of linear factors can be found with the aid of a power table. When these evident real roots are eliminated, the residue polynomial can be factorized in quadratic polynomial factors. A 'Table Method' is devised by which coefficient approximations can easily be found, and methods are shown for use when solving a quartic equation and when solving a sextic equation. (Author)

AD-427 883 Div. 15
OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
ON A SYSTEM OF EQUATIONS RELATED TO A POLYNOMIAL,
by Kurt H. Haase. Nov 63, 9p.
Proj. 5628, Task 562806
AFCRL 63 533 Unclassified report

Descriptors: (*Equations, Polynomials), Numerical analysis.

From a polynomial, a system of n+1 equations can be derived. The system was obtained for the polynomial orders n=4 and n=6. The results gave sufficient evidence that similar systems can be derived from a polynomial of any even order n. Proof is given that an indefinite number of equations are related with an even order polynomial. A certain pair of all these equations has the property that a pair of its solutions is identical with the coefficients in a factor of the polynomial. This fact is the key to a new technique of solving algebraic equations. The related pair of equations are described. (See also AD-427 882 and AD-428 090). (Author)

16. MEDICAL SCIENCES

AD-427 012 Div. 16
OTS price $7.60

Bernice P. Bishop Museum, Honolulu, Hawaii.
ECOLOGICAL STUDIES OF PHLEBOTOMUS SANDFLIES IN THE PALOICH AREA, UPPER NILE PROVINCE, SUDAN. Final rept.,
by Laurence W. Quate. 31 Dec 63, 72p.
Grant NonrG00055 63 , Proj. NR103 570
Unclassified report

Descriptors: (*Diptera, Ecology), Behavior, Flight, Reproduction (Physiology), Classification, Morphology (Biology).

Ecological studies of Phlebotomus sandflies in the Paloich Area, Upper Nile Province, Sudan, described previously are presented. The taxonomy is also presented of the Phlebotomus sandflies of the Paloich area. Only information of systematic pertinence is included, as biological characteristics of the species have already been described in detail. (Author)

AD-427 039 Div. 16
OTS price $1.00

Yale U., New Haven, Conn.
THERMAL AND METABOLIC RESPONSE OF THE KALAHARI BUSHMEN TO MODERATE COLD EXPOSURE AT NIGHT,
by H. T. Hammel, J. A. Hildes, D. C. Jackson and H. T. Andersen. Sep 63, 29p.
Contract AF41 657 415, Proj. 8237 02
AAL TDR62 44 Unclassified report

Descriptors: (*Body temperature, Man), Metabolism, Oxygen consumption, Skin, Exposure, Tolerances (Physiology).

Descriptors: (*Functions, Programming (Computers), Special functions, Series.

Methods for evaluation are examined of the basic Jacobian elliptic functions, in terms of which 9 others can easily be expressed. Some attention is devoted to Jacobi's zeta function, Jacobi's nome q, and to K(m), the complete elliptic integral of the first kind. Several computation methods are indicated in each case, not only for comparison purposes, but also in order that the reader may examine these processes with his own machine in mind. (Author)

AD-427 355 Div. 15, 30
OTS price $15.50

Systems Research Labs. Inc., Dayton, Ohio.
RESEARCH ON RESIDUE NUMBER SERIAL COMPUTATION TECHNIQUES.
Final technical rept. 15 June 62-15 June 63,
by C. Ross, C. K. Kim, R. E. Ihnot and W. D. Markel. Nov 63, 1v.
Contract AF33 657 8727, Proj. 7062, Task 706205
RTD TDR63 4034 Unclassified report

Descriptors: (*Number theory, Complex numbers), (*Computers, Programming), Algebra, Numerical analysis, Complex numbers, Programming language, Matrix algebra, Networks, Numbers.

The problems of serial computation in a modular computer are summarized. In Section 2, Specific methods for sign determination are discussed. Investigations on overflow detection and base extension are described. For each modulus chosen, the efficiency of the system is given. Number theory is extended to the complex domain. Basis definitions and theorems with regard to the theory are given. A system called fixed point gamut is presented for the purpose of handling the difficulties of modular computation. Investigations on the time study for various methods of computations are discussed. The practical aspects of residue number theory are stressed and illustrate certain particularly advantageous applications. The general problem of residue number coding, both from the standpoint of theory and handware is reviewed. (Author)

AD-427 378 Div. 15
OTS price $1.60

Boeing Scientific Research Labs., Seattle Wash.
A ''STRING ALGORITHM'' FOR SHORTEST PATHS IN DIRECTED NETWORKS,
by Victor Klee. Nov 63, 8p. Document no. D1 82 0319, Mathematical note no. 333
Unclassified report

Also available from the author.

Descriptors: (*Networks, Optimization), Dynamic programming.

A simple cutting procedure is described which can be combined with any algorithm for undirected networks (symmetric distance matrix) so as to form a shortest-path algorithm for directed networks (asymmetric distance matrix). In particular, the cutting and stretching can be alternated to form a ''string algorithm'' for directed networks. (Author)

AD-427 512 Div. 15
OTS price $3.60

Chicago U., Ill.
CATEGORICAL ALGEBRA,
by Saunders Mac Lane. 1963, 30p.
Grant AF AFOSR62 170
AFOSR J1531 Unclassified report

Colloquium Lectures given at the sixty-eighth Summer Meeting of the American Mathematical Society, 27-30 Aug 63, at Boulder, Colorado.

Descriptors: (*Algebras), Algebraic topology, Algebra, Groups (Mathematics).

AD-427 526 Div. 15
OTS price $1.60

Syracuse U., N. Y.
PROBLEMS ON MEROMORPHIC FUNCTIONS.
Final rept., 1 July 59-30 June 63,
by Albert Edrei. 30 June 63, 3p.
Contract AF49 638 571
AFOSR J1536 Unclassified report

Descriptors: (*Functions, Research program administration), Bibliography, Complex variables.

For a four-year period, the field of meromorphic functions was researched. Stress was placed on the study of Nevanlinna's theory, particularly the notion of 'deficient value.' Bibliographic data are included of papers written on this topic. (Author)

AD-427 710 Div. 15
OTS price $1.10

Institute of Tech., U. of Minn., Minneapolis.
(No title).
Final technical rept., 1 June 62-31 May 63.
6 Dec 63, 4p.
Grant AFOSR62 101
AFOSR J1443 Unclassified report

Descriptors: (*Calculus of variations, Research program administration), Nonlinear differential equations, Partial differential equations, Boundary value problem, Equations, Inequalities, Measure theory, Integrals, Abstracts.

Contents: Variational calculus, Linear and nonlinear partial differential equations, and Navier Stokes equations.

AD-427 753 Div. 15, 30
OTS price $3.60

Stanford U. School of Humanities and Sciences, Calif.
THE SOLUTION OF LARGE SYSTEMS OF ALGEBRAIC EQUATIONS,
by John M. Pavkovich. 6 Dec 63, 38p.
Contract Nonr225 37; Proj. NR044 211
Unclassified report

Descriptors: (*Algebra, Equations), (*Equations, Programming (Computers), Control sequences.

A method for solving a system of linear algebraic equations is described. This method was implemented on the IBM 7090 at Stanford for equations with complex coefficients. Although all figures quoted related to tape movement and arithmetic speed are for this computer, the ideas behind the method are applicable to any computer which has the ability to read tape, write tape, and compute simultaneously. The method used to solve the system of equations is basically Gauss's method with partial pivoting. When applied to a system of equations too large to fit

Two studies have been done with rats continuing the analysis of atropine's retarding effect on learning. First, comparisons have been made between the effects of atropine and atropine methylnitrate on discrimination learning. Atropine methylnitrate was found to have no effect on multiple cue successive discrimination. This finding supports the view that atropine's effect is due to its cen/ral action. Secondly, pilot studies suggesting qualitatively different effects of atropine in a simultaneous discrimination have been pursued in a design comparing simultaneous versus successive discrimination on a single cue problem. Atropine was found to have no effect on either problem suggesting that cue complexity is an important dimension of atropine's effect. This is presently under investigation. Physostigmine, in a narrow dose range, was found to facilitate the acquisition of visual discrimination in cats. These studies are being pursued, both by means of further behavioral analysis and with electrophysiological indices, to gain a better understanding of the learning process.

AD-427 086 Div. 16
OTS price $5.60

Fordham U., New York.
INDEX TO SELECTED LISTS OF NOTEWORTHY ARTICLES IN RECENT SOVIET PUBLICATIONS AND SELECTED ABSTRACTS FROM SOVIET BIO-MEDICAL JOURNALS, SERIES I, NOS. 1-11.
Nov 63, 50p,
Contract DA18 108 405CML867
Unclassified report

Descriptors: (*Bibliographies, Medical research), (*Medical research, Bibliographies), Subject indexing, Biology, Microorganisms, Immunology, Disease, Therapy, Parasites, Biochemistry, Radiobiology.

AD-427 146 Div. 16
OTS price $1.60

RAND Corp., Santa Monica, Calif.
MAN'S THERMAL BALANCE IN SPACE ENVIRONMENTS,
by Herman P. Roth. Oct 63, 14p. Rept. no. P2810
Contract NASr21 08
Unclassified report

Descriptors: (*Space flight, Temperature), (*Temperature, Tolerances (Physiology)), Space environmental conditions, Water, Pressure suits, Reliability, Physiology, Gravity.

AD-427 153 Div. 16
OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF THE ACADEMY OF SCIENCES OF THE USSR. BIOLOGICAL SERIES (SELECTED ARTICLES).
4 Dec 63, 21p.
FTD TT63 1052 Unclassified report

Trans. from Izvestiya Akademiya Nauk SSSR, Seriya Biologicheskaya, No. 5, pp. 719-723 and 746-754, Sep-Oct 1963.

Descriptors: (*Nucleic acids, Chlorophylls), (*Chlorophylls, Biosynthesis), (*Albumins, Chlorophylls), Muscles, Skeleton, Weightlessness, Radioactive isotopes, Tracer studies, Metabolism.

AD-427 166 Div. 16
OTS price $.50

Bryn Mawr Coll., Pa.
EFFECT OF EXPOSURE TO LOW TEMPERATURE ON BLOOD CLEARANCE OF CARBON AND BACTERIA IN MICE,
by L. J. Berry. July 63, 12p.
Contract AF41 657 340, Proj. 8241, Task 824101
AAL TDR63 1 Unclassified report

Descriptors: (*Low temperature research, Blood), (*Blood, Carbon), (*Bacteria, Blood), Mice, Salmonella.

Mice housed at 5 C clear carbon from the blood more slowly than animals at 25 C but those in the cold clear at the same rate even after exposures of 2, 18 or 72 hours prior to the test. Bacteria are also cleared uniformly at the two temperatures when a highly virulent strain of Salmonella typhimurium is injected intravenously but not when one of low virulence is used. Here, mice at 25 C show a steady decline in bacteremic level but not those at 5 C. The LD50 dose of bacteria via the intravenous route is higher that the intraperitoneal dose with strains of each virulence in mice kept at 25 C but it is clearly lower for the mice housed at 5 C. In line with these findings is the observation that exposure to 5 C for 8 hours postinfection followed by 16 hours at 25 C yields mortalities similar to continuous exposure to 25 C and vice versa. (Author)

AD-427 167 Div. 16
OTS price $.75

Bryn Mawr Coll., Pa.
THE IMPLICATION OF TRYPTOPHAN PYRROLASE IN ENDOTOXIN POISONING,
by L. J. Berry. Sep 63, 21p.
Contract AF41 609 1764, Proj. 8241, Task 824101
AAL TDR63 13 Unclassified report

Descriptors: (*Toxins & antitoxins, Bacteria), (*Bacteria, Toxins & antitoxins), Mice, Enzymes, Lethal dosage, Hormones, Amides, Nucleotides, N-heterocyclic compounds, Organic phosphorus compounds.

An attempt has been made to relate the protective effect of cortisone against lethality of bacterial endotoxins in mice to changes in activity of liver tryptophan pyrrolase (TP), an enzyme known to be activated by the hormone. In mice maintained at 25 C, TP activity remained normal under conditions associated with survival and diminished in activity when animals were not protected. In addition, nicotinamide and diphosphopyridine nucleotide (DPN) were found to protect mice at 25 C against lethality of endotoxin about as effectively as cortisone. At 5 C, however, mice could not be protected against death from endotoxin by DPN and even cortisone and nicotinamide were less effective than at 25 C. Mice in the cold die sooner than and with different symptoms from those at room temperature. (Author)

AD-427 169 Div. 16
OTS price $1.10

New Hampshire U., Durham.
RELATIONSHIP OF COLD UPON THE BIOLOGICAL PROPERTIES PECULIAR TO INFLUENZA VIRUS AND ITS CAPACITY FOR MULTIPLICATION,
by T. G. Metcalf. Aug 63, 6p.
Contract AF41 657 350, Proj. 7955 19
AAL TN62 12 Unclassified report

Studies were made of 10 adult male Bushmen and four Europeans during night-long exposure to ambient temperatures of approximately 6 C using only single-blanket sleeping bags. Four Bushmen were studied twice. Measurements were made of oxygen consumption, rectal and skin temperatures, muscle activity and sleep. Five Bushmen were also studied during a night with extra blankets. Rectal temperature of both groups started at about 36.8 C, but in the Bushmen fell 0.7 C lower than in the Europeans during the cold night. Calculated mean body temperature also fell lower in the Bushmen. Mean skin temperature of the Bushmen started higher but was the same as that of the Europeans at the end of the night, although the foot temperatures of the Bushmen were lower. The heat production of both groups was the same at the start, expressed as kcal per kg lean body mass per hour (approximately 1.5). Both rose during the cold night but the Bushmen increase was only half as great as that of the Europeans. Shivering in the Bushmen was less than in the Europeans and sleep was interrupted less in the Bushmen. The results indicate a difference between Bushmen and Europeans in response to cold. (Author)

AD-427 040 Div. 16
OTS price $.50

Washington U., Seattle.
CELL PROLIFERATION IN THE ADRENAL OF CONTROL AND COLD EXPOSED RATS,
by N. B. Everett and Shirley J. Weber. Aug 63, 8p.
Contract AF41 657 309, Proj. 8237, Task 823702
AAL TDR63 7 Unclassified report

Descriptors: (*Cells (Biology), Adrenal glands), (*Exposure, Cells), Rats, Tritiated compounds, Tracer studies, Inhibition, Autoradiography, Labeled substance, Metabolism.

Tritiated thymidine coupled with high resolution radioautography was employed to assess new cell formation in the adrenal of control rats and of animals after different periods of cold exposure. Evidence is presented for new cell formation in each of the three cortical zones of controls and of experimental rats during all periods of cold exposure. Cold exposure effected an increase in new cell formation within the glomerular and fasciculate zones but not in the reticular zone. The results support the concept of functional independence of the three cortical zones. A small percentage of the chromaffin cells of the adrenal medulla was labeled in both control and experimental animals, indicating a slow rate of renewal that seemed not to be changed by cold exposure. (Author)

AD-427 041 Div. 16
OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska
RECTAL TEMPERATURE OF THE WORKING SLED DOG,
by C. J. Eagan, J. L. Durrer and W. M. Millard. Oct 63, 8p.
Proj. 8237, Task 823702
AAL TDR63 40 Unclassified report

Descriptors: (*Body temperature, Dogs), Temperature, Measurement, Physiology, Heat.

Rectal temperatures were measured on Husky sled dogs doing hard work (sled pulling) at ambient temperatures of 0 degree C and lower. Even in efforts that seemed maximal, rectal temperature usually increased no more than 1 degree C above the mean resting temperature range of 38.5 degrees to 38.9 degrees C. In exceptional cases it increased as much as 2 degrees C. The mean rectal temperature measured on 17 dogs at the end of a 30-mile (48.3 km) championship race was 39.7 degrees C. It is concluded that the dissipation of body heat produced during heavy work in the cold imposes no physiological strain on the Husky sled dog. (Author)

AD-427 053 Div. 16
OTS price $.50

Harvard U. Medical School, Boston, Mass.
HIBERNATION MAMMALS AND BIRDS,
by C. P. Lyman. Aug 63, 13p.
Contract AF41 657 380, Proj. 8237, Task 823703
AAL TDR63 3 Unclassified report

Descriptors: (*Hibernation, Mammals), (*Birds, Hibernation), (*Mammals, Hibernation), Physiology, Temperature, Temperature control.

Hibernation in mammals and birds, from its initiation through the long dormancy to the violent arousal, is a controlled process, developed through evolution to permit the animal to escape from an unfavorable environment. The same type of hibernation, using the same basic physiological modification, occurs in mammals which are so remotely related phylogentically that one must conclude that hibernation developed separately in several groups as the environmental stress arose. It is not a primitive return to the cold-blooded state indicating a vestigial reptilian type of temperature control, but rather a specialized temperature regulation with precise control of its own. (Author)

AD-427 054 Div. 16
OTS price $.50

Harvard U. Medical School, Boston, Mass.
EFFECT OF LOW TEMPERATURE ON THE ISOLATED HEARTS OF CITELLUS LEUCURUS AND C. MOHAVENSIS,
by C. P. Lyman. Sep 63, 5p.
Contract AF41 657 380, Proj. 8237, Task 823703
AAL TDR63 4 Unclassified report

Descriptors: (*Temperature, Hibernation), (*Hibernation, Temperature), Tolerances (Physiology), Heart, Laboratory animals, Low temperature research.

The perfused, isolated hearts of two desert-living ground squirrels, Citellus mohavensis and C. leucurus, were exposed to temperatures between 25 and 0 C. Although mohavensis hibernates and aestivates and leucurus does neither, the temperature-rate curves were very similar, and typical of hibernators in general. Leucurus is highly adapted to a diurnal existence in hot arid regions and has a high critical and lethal temperature, yet its heart has not changed its ability to tolerate low temperatures. (Author)

AD-427 057 Div. 16, 28
OTS price $1.10

Kentucky U., School of Medicine, Lexington
PHARMACOLOGICAL ENHANCEMENT OF PERFO(MANCE.
Progress rept., 1 Apr 63-1 Jan 64.
by James M. Whitehouse. 1 Jan 64, 7p.
Contract DA49 193MD2412
Unclassified report

Descriptors: (*Atropine, Learning), Pharmacology, Drugs, Intelligibility, Physiology.

by John B. Storer. 31 July 63, 13p.
Contract DA49 193MD2289
Unclassified report

Descriptors: (*Radioprotective agents, Effectiveness), Organic compounds, Radiation effects, Mice, X rays, Serotonin, Histology, Pathology, Toxicity, Dosage.

A study is in progress to determine whether standard radioprotective agents (beta-mercaptoethylamine, p-aminopropiophenone, 2-aminoethylisothiouronium bromide, and serotonin) will protect mice against the late deleterious effect of X-ray exposure. A total of 7200 treated and control mice have been exposed to four dosage levels of X rays and set aside for longevity and histopathology studies. Both sexes from strains A/J and C57BL/6J have been included Seven radioprotective agents provided by the Walter Reed Army Institute for Research have been evaluated in terms of chemical toxicity and radioprotective effect. The ratios of X-ray LD50 values for treated mice to the control LD50 values ranged from 1.2 to 1.6. The comparable values for the standard agents listed above were 1.5 and 1.8. (Author)

AD-427 290 Div. 16
OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
FLUOROMETRIC ANALYSIS OF AMIDASE AND ALKALINE PHOSPHATASE IN NEONATAL RAT THYMOCYTES: PEAK ACTIVITIES AT TWO DAYS OF AGE,
by L. J. Greenberg and L. J. Cole. 18 Nov 63, 20p.
Task MR005 08 5200
NRDL TR695 Unclassified report

Descriptors: (*Enzymes, Biochemistry), (*Lymphocytes, Rats), (*Lymphatic system, Rats), Infants, Immunity, Histology, Laboratory animals, Cells (Biology).

Activities of four amidases and alkaline phosphatase were studied in lymphoid cells obtained from the thymuses of rats during the first 21 days of post natal life. Alkaline phosphatase activity increases rapidly from a value of 1.4 on day one to 24.4 on day 2, and declines steadily until day 7 from which time there is a constant activity (3.5) through day 21. Similar activity profiles obtain for leucyl, alanyl and phenylalanyl amidases showing maxima on day 2 of 26.2, 28.9, and 21.3 respectively. Comparatively constant activity levels are reached after one week, leucyl having the lowest value, 3.7, phenylalanyl slightly higher, 4.5, and alanyl the highest, 9.3. Glycyl amidase activity is nil on day one, rises to a maximum activity of 12.4 on day 2, and falls off again to an immeasurable quantity by day 14. Histological examination of thymuses over the period studied revealed a relative increase in the number of large lymphoid cells. The changes in enzyme activities appear to reflect changes in the large thymocyte population. (Author)

AD-427 298 Div. 16
OTS price $6.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DATA FROM THE CONFERENCE DEALING IN METHODS OF PHYSIOLOGICAL INVESTIGATIONS OF HUMAN BEINGS (SELECTED ARTICLES).
10 Dec 63, 59p.
FTD TT63 916 Unclassified report

Trans. from Materialy Konferentsii Po Metodam Fiziologicheskikh Issledovaniy Cheloveka, Institut Gigeny Truda i Profzabolevaniy AMN SSSR, Moskovskoye Obshchestvo Fiziologov, pp. 12, 15-23, 32-36, 40-42, 65-68, 83-85, 88-89, 98-108, 163-165, 186-194, 199-202 and 207, 1962.

Descriptors: (*Physiology, Medical research), Cardiography, Nervous system, Medicine, Telemeter systems, Heart, Electroencephalography, Respiration, Analysis, Muscles, Exercise, Diurnal variations.

AD-427 310 Div. 16, 2
OTS price $6.60

Laboratory of Tree-Ring Research, U. of Arizona, Tucson.
DENDROCLIMATOLOGICAL RESEARCH FOR 1963.
by Harold C. Fritts and David G. Smith. Jan 64, 1v.
Contract Cwb10518
Unclassified report

Descriptors: (*Trees, Growth), (*Climatology, Trees), Aging (Physiology), Tables, Ecology, Maps.

The research consists of screening by multiple regression techniques for those climatic factors which are the best predictors of growth. Once the effective climatic complex for tree-growth relationships has been defined, it is hoped that screening techniques can be employed to predict the climatic complex from tree-ring information. The second phase of the work represents a study of correlation with distance among master tree-ring chronologies as it relates to possible differences in circulation patterns. The implications of this study to paleoclimatic interpretation are discussed. (Author)

AD-427 318 Div. 16, 23
OTS price $2.00

Bell Aerosystems Co., Buffalo, N. Y.
DEVELOPMENT OF VISUAL SIMULATION TECHNIQUES FOR ASTRONAUTICAL FLIGHT TRAINING, VOLUME II. IMAGE ASSEMBLY TECHNIQUES FOR VISUAL SIMULATION OF ORBITING FLIGHT.
Rept. for Mar 62-Apr 63,
by L. Gerhardt and A. B. Johnson. Nov 63, 70p.
Contract AF33 616 7802, Proj. 6114, Task 611405
AMRL TDR63 54 vol. 2 Unclassified report.

Report on Training Equipment, Simulators, and Techniques, for Air Force Systems.

Descriptors: (*Flight, Training devices), Signals, Amplifiers, Television equipment, Light, Beams (Electromagnetic), Simulation, Display systems, Circuit, Design, Cameras, Resolution, Television display systems, Astronautics.

A program was conducted to study techniques for the development of keying signals, to develop a switching amplifier compatible with high resolution television equipment, and to experimentally evaluate the performance of a 1-1/2 inch vidicon camera and a modulated hight beam television projector. The various possible methods for developing a keying signal for matting control of multiple image generation were studied in an effort to determine the best technique for application to the simulation problem. A switching amplifier was developed to fill a gap existing in available high resolution equipment. A new 1-1/2 inch vidicon camera was documented for future applications in the simulation field. A modulated light beam projector was also documented for future reference. (Author)

Descriptors: (*Influenza virus, Reproduction (Physiology)), Microorganisms, Gastrointestinal system, Hibernation, Escherichia, Tissue culture, Excretion, Enzymes, Rodents.

Alaskan ground squirrels were examined for their excretion of animal and bacterial viruses. Eighty-one separate fecal samples from 25 animals yielded negative findings for bacterial viruses reactive against five strains of Escherichia coli. Sixty-six individual fecal samples from 24 animals failed to show the presence of animal viruses capable of causing cytopathogenic effects in HeLa, Human Amnion and the LLMK2 strain of monkey kidney monolayers. The significance of the findings for animal viruses is presented. Two successful ground squirrel breedings were accomplished with five baby squirrels produced in each litter. Neuraminidase activity of influenza virus was demonstrated at 25 C. The amount of neuraminic acid split from substrate by enzyme action at 25 C was less than that observed at 37 C. Ovomucin obtained from fresh hens eggs was prepared and shown capable of serving as a suitable substrate for influenza neuraminidase. (Author)

AD-427 201 Div. 16
OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
METABOLIC STUDIES OF AN AMINO ACID IMBALANCE IN COLD EXPOSED RATS,
by G. J. Klain and R. L. Winders. Aug 63, 11p.
Proj. 8238, Task 823803
AAL TDR63 33 Unclassified report

Descriptors: (*Amino acids, Metabolism), (*Metabolism, Amino acids), Diet, Enzymes, Carbon dioxide, Tracer studies, Rats, Biosysthesis, Body weight, Temperature.

Young rats fed an amino acid-imbalanced diet based on 6% fibrin, and supplemented with 0.4% DL-methionine and 0.6% DL-phenylalanine had increased activities of liver arginine synthetase and arginase, and increased plasma levels of a number of amino acids. However, the activities and levels of these metabolites were decreased in a comparable group of animals exposed to 7 C. The activity of the expired CO2, originating from intraperitoneally administered 2 microcuries each of carbon labeled methionine, phenylalanine or alanine, indicated that the rats kept at room temperature could not effectively oxidize the two imbalancing amino acids to maintain a proper balance in the amino acid pool for the protein synthesis. In contrast, the cold-exposed animals were able to catabolize the excessive levels of methionine and phenylalanine and utilize them for energy purposes. The remaining balanced portion of the amino acid pool was then apparently used for the formation of new tissues, as also indicated by greater gains in body weight. In another experiment it was shown that protein-depleted rats exposed to 3 C for 27 hours readily consumed the imbalanced diet, while the food intake of a comparable group of rats kept at 25 C fell off sharply 18 hours after the animals had been given the diets. (Author)

AD-427 202 Div. 16
OTS price $1.10

Johns Hopkins U., Baltimore, Md.
THE EFFECT OF COLD ON SOME ASPECTS OF PROTEIN METABOLISM,
by Bacon F. Chow. Aug 63, 8p.
Contract AF41 657 299, Proj. 8238 03
AAL TN62 11 Unclassified report

Descriptors: (*Proteins, Metabolism), (*Metabolism, Proteins), Temperature, Rats, Diet, Excretion, Nitrogen, Urine, Measurement.

AD-427 213 Div. 16, 28
OTS price $3.60

Duke U., School of Medicine, Durham, N. C.
BODY AND FIELD PERCEPTUAL DIMENSION AND ALTERED SENSORY ENVIRONMENTS.
Annual rept., Oct 62-Oct 63,
by Sanford I. Cohen and A. J. Silverman. Oct 63, 35p.
Grant AF AFOSR57 63 Unclassified report

Descriptors: (*Sensory mechanism, Stress (Physiology)), (*Nervous system, Stimulation), Learning, Perception, Vision, Insulin, Fats, Adrenal gland, Body, Neurology, Psychology.

A total of 406 subjects have been tested for perceptual mode and used in a series of experiments over the past three years. One hundred and five subjects were body-oriented; 212 fell into a middle range and 75 have been field-oriented. In the experiments now being conducted many subjects are being studied in a number of experimental sessions so that the scope of the individual samples will be considerably broadened. The investigations described in this report and previous reports have been undertaken to delineate more carefully differences in body-oriented and field-oriented subjects. Differences in autonomic and behavioral conditioning characteristics together with differences in discrimination learning have been studied. One of the results of this series of experiments may be to lead to the development of techniques to influence the efficiency with which goal directed behavior is maintained or to influence the rapidity of learning complex perceptual and motor tasks (e. g., tasks which are carried out in response to certain signals). (Author)

AD-427 261 Div. 16
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ANALYZING THE EFFECT OF PHYSICAL LOAD, HIGH TEMPERATURE OF THE MEDIUM AND HIGHER OXYGEN CONTENT IN INHALED AIR ON THE EXCITABILITY OF HUMAN VISUAL ANALYZER,
by A. O. Navakatikyan and V. V. Lebedeva.
3 Dec 63, 13p.
FTD TT63 980 Unclassified report

Trans from Fiziologicheskiy Zhurnal SSSR, 49:9, pp. 1036-1043, 1963.

Descriptors: (*Temperature, Tolerances (Physiology), Excitation, Electricity, Stimulation, Scientific research, Air, Respiration, Nervous system.

AD-427 279 Div. 16
OTS price $1.60

Roscoe B. Jackson Memorial Lab., Bar Harbor, Maine.
EVALUATION OF RADIOPROTECTIVE AGENTS.
Annual progress rept., 1 Aug 62-31 July 63,

AD-427 755 Div. 16
OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
RBE OF SOME SODIUM, WATER AND BIOELECTRIC PARAMETERS OF GASTROINTESTINAL ABSORPTION.
by B. E. Vaughan, A. K. Davis, J. T. Cummins and E. L. Alpen. 8 Nov 63, 16p.
USNRDL TR693 Unclassified report

Descriptors: (*Radiation effects, Gastrointestinal system), (*Gastrointestinal system, Radiation effects), Absorption (Biological), Transport properties, Water, Sodium, Ions, Membranes (Biology), Neutron beams, X-rays, Permeability, Electric potential, Radiological dosage, Rats, Radiobiology.

AD-427 789 Div. 16
OTS price $1.10

Naval Dental School, Bethesda, Md.
A PORTABLE DENTAL STERILIZING CYLINDER,
by L. W. Wachtel and L. M. Armstrong. 28 June 63, 4p.
Unclassified report

Descriptors: (*Laboratory equipment, Purification), (*Dentistry, Laboratory equipment), Portable (Man-portable), Gases, Temperature.

The report describes an aluminum cylinder in which dental instruments could be sterilized under emergency field conditions and at the same time be protected against corrosion. The procedure involves loading the cylinder with dental instruments, flushing it with ethylene oxide-Freon gas, closing it, and then immersing it in boiling water for 1 hour. In preliminary experiments with a prototype of the sterilizing cylinder, dental instruments were sterilized by the procedure employed, and steel instruments were not visibly altered. (Author)

AD-427 799 Div. 16
OTS price $8.10

Wisconsin U., Madison.
BIBLIOGRAPHY ON SALMONELLA EXCLUSIVE OF SALMONELLA TYPHI (SUPPLEMENT VI).
1961, 85p.
Contract DA18 064 404CML58
Unclassified report

Descriptors: (*Bibliographies, Salmonella), (*Salmonella, Bibliographies), Microorganisms, Toxin & antitoxins, Bacteriophages, Genetics, Epidemiology, Disease vectors, Infections, Swine, Equines, Dogs, Cats, Rodents, Therapy, Control, Diagnosis, Birds, Water, Children, Food, Sewage, Soils, Immunity, Physiology, Culture media, Antigens & antibodies, Distribution, Morphology (Biology), Diseases.

AD-427 811 Div. 16
OTS price $1.60

Palo Alto Medical Research Foundation, Calif.
GEOGRAPHICAL DISTRIBUTION AND CHANGING INCIDENCE OF PARASITES OF MAN IN THE NEAR AND MIDDLE EAST.
Progress rept., 1 Mar-1 Dec 63,
by Edward P. Mumford. 2 Jan 64, 3p.
Contract DA49 193MD2249
Unclassified report

Descriptors: (*Parasites, Distribution), Diseases, Epidemiology, Public health, Analysis, Medicine.

The objective of the project is to continue the analysis and publishing of extensive new material assembled since the principal investigator's 1960 publication on 'The Distribution of Some Parasites of Man in the Near and Middle East.' The ultimate purpose is to investigate changing incidence of these parasites in relation to the long-term development of this important strategic area where living standards are low and health measures commonly inadequate. Research will continue at an increased rate with the aid of nearly 100 consultants, utilizing information from nine countries concerning diseases now listed as 128. The new material will be tabulated and available upon request. (Author)

AD-427 860 Div. 16
OTS price $19.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INJURIES TO THE SKULL AND BRAIN IN ACUTE RADIATION (Raneniya Cherepa i Golovnogo Mozga Pri Ostroy Luchevoy Bolenzni),
by N. N. Aleksandrov, S. V. Ryzhkov, L. S. Sukozatykh, I. A. Chalisov and I. G. Ramzen-Yevdokimov. 11 Oct 63, 311p.
FTD TT63 581 Unclassified report

Trans. from Gosudarstvennoye Izdatel'stvo Meditsinskoy Literatury, Medgiz, Leningradskoye Otdeleniye, pp. 1-175, 1962.

Descriptors: (*Infections, Head), (*Wound and injuries, Therapy), Brain, Medical research, Rabbits, Meninges, Antibiotics, Surgery, Penicillins, Streptomycins, Physiology, Diseases, Hematology, Radiation effects, Healing.

The results are described of numerous experiments on animals which have made it possible for the authors to clarify the important special characteristics of the clinical course, treatment, and outcome of infected wounds of the skull and brain in persons affected by penetrating radiation. The characteristics of the clinical manifestations and diagnostics of the injuries to the brain and intracranial infectious complications which develop during acute radiation sickness are discussed, and the results of surgical treatment and the use of various antibiotics are described. These experiments are used for recommending a broadening of the indications for using a primary blind suture. A method for using antibiotics is given which makes it possible to obtain satisfactory results in treating infected wounds of the skull and brain during acute radiation sickness, even when there is a considerable delay in the initial surgical treatment. (Author)

AD-427 878 Div. 16
OTS price $9.10

Fordham U., New York.
A REVIEW OF SELECTED PROBLEMS OF TULAREMIA IN THE SOVIET UNION. PART II/A. VACCINES AND VACCINATION,
by Robert Pollitzer. Oct 63, 105p.
Contract DA18 108 405CML867A
Unclassified report

Descriptors: (*Pateurella, Diseases), (*Vaccines, Pasteurella), Reviews, History, Agglutinins, Immunity, Mice, Rodents, Diagnostic agents, Nose, Mouth, Lungs, Skin, Smallpox virus, Brucella, Pathology, Clostridium, Streptomycins.

Division 16 - MEDICAL SCIENCES

AD-427 396 Div. 16
OTS price $10.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PRIMARY PROCESSES OF RADIATION LESION (Pervichnyye Protessy Luchsvogo Porazheniya),
by B. N. Tarusov. 9 Oct 63, 135p.
FTD TT63 733 Unclassified report

Trans. from Gosudarstvennoye Izdatel'stvo Literatury v Oblasti Atomnoy Nauki i Tekhniki, pp. 1-96, 1962.

Descriptors: (*Radiation effects, Pathology), Theory, Radiochemistry, Oxygen, Radioprotective agents, Radiation tolerance, Sensitivity, Toxins & antitoxins.

AD-427 413 Div. 16
OTS price $1.00

Radiation Applications, Inc., Long Island, N. Y.
THE FEASIBILITY OF USING MEMBRANES FOR URINE PURIFICATION.
Rept. for June 62-June 63,
by Eric A. Meier and Richard Everett, Jr. Nov 63, 31p.
Contract AF33 657 9347, Proj. 6373, Task 637304
AMRL TDR63 113 Unclassified report

Report on Equipment for Life Support in Aerospace.

Descriptors: (*Urine, Purification), (*Water, Recovery), Feasibility studies, Filters (Fluid), Membranes (Biology), Wastes (Sanitary engineering).

The feasibility of using synthetic membranes in an ultrafiltration process for recovering potable water from urine was demonstrated with urine specimens which had been enzymatically treated and acidified with citric acid. Specially cast cellulose acetate membranes were used in an experimental ultrafiltration system to reclaim waters which met the United States Public Health Service specifications on chloride ion and total dissolved solids. The product water was obtained at initial flux rates of approximately 10-20 liters per square foot of filtration surface per day at operating pressures of approximately 2000 pounds per square inch. A proposed design of an ultrafiltration unit is included along with a comprehensive discussion of the engineering considerations deemed significant. (Author)

AD-427 559 Div. 16
OTS price $1.10

Oklahoma State U., Research Foundation, Stillwater.
CHEMICAL STUDIES ON UREASE.
Final rept. 1 June 60-31 Dec 63,
by George Gorin. Jan 64, 6p.
Contract Nonr259502, Proj. NR108 486
Unclassified report

Descriptors: (*Urease, Chemistry), Enzymes, Preparation, Purification, Analysis, Amino acids, Diffusion.

The objectives of this research project were: (1) to investigate the chemistry of urease; and (2) to determine the nature of the active site and the mechanism of its action. A prime requirement in the pursuit of objective (1) was to have enzyme preparations with well-defined and reproducible properties. Considerable progress was made in this direction. The specific activity is a particularly important property, and its determination has been subjected to critical examination. Measurements made with the ultracentrifuge have aided in characterizing the enzyme preparations. In carefully controlled conditions, preparations were obtained which gave a single peak in sedimentation velocity determinations. On appropriate treatment, such preparations can be dissociated to smaller subunits. The amino-acid composition of urease was investigated and accurate data obtained for sulfur-containing amino acids, and preliminary results for other amino acids. Treatment of urease with silver (I) ions and N-ethylmaleimide gave interesting results. (Author)

AD-427 644 Div. 16
OTS price $1.10

Johns Hopkins U., School of Hygiene and Public Health, Baltimore, Md.
(No title).
Final rept., Oct 62-Oct 63,
by Bacon F. Chow. Oct 63, 6p.
Grant AF AFOSR147 63
AFOSR J1411 Unclassified report

Descriptors: (*Iron, Metabolism), (*Metabolism, Iron), Pressure, Hemoglobin, Oxygen, Absorption, Synthesis, Radioactivity, Measurement, Liver, Kidneys, Spleen, Erythrocytes, Hormones.

AD-427 723 Div. 16
OTS price $1.50

Wisconsin U., Madison.
BIBLIOGRAPHY ON ASPECTS OF THE BIOLOGY AND PATHOGENICITY OF STAPHYLOCOCCUS AUREUS.
1961, 51p.
Contract DA18 064CML58
Unclassified report

Descriptors: (*Bibliographies, Staphylococcus), (*Staphylococcus, Bibliographies), Injectinns, Bacteriophages, Vaccines, Microorganisms, Detection, Diagnosis, Enzymes, Toxins and antitoxins, Food poisoning, Diseases.

AD-427 726 Div. 16
OTS price $1.60

Maryland U., College Park.
SPECTRAL SENSITIVITY OF SMALL RETINAL AREAS.
Annual progress rept., 1 Jan-31 Dec 63,
by John Krauskopf. 31 Dec 63, 15p.
Contract DA49 193MD2327
Unclassified report

Descriptors: (*Retina, Sensitivity), (*Eye, Sensitivity), Visual acuity, Illumination, Distortion, Stimulation.

Experiments evaluating the significance of spherical and chromatic aberration in the degradation of human retinal images were performed. It was found that these defects were not primary causes for the failure of the eye to perform as well as a theoretically ideal optical system. The most significant defect of the eye is, in all probability, irregular variation in dioptric power over the plane of the pupil. Measurements of the amount of light reflected through different parts of the pupil revealed that more light is reflected through the center of the pupil than near its margin. This result is analogous to the psychophysical Stiles-Crawford effect and may bear some causal relation to it. (Author)

gas'fication, Cesium), Zirconium, Sodium, Potassium, Rubidium, Physical properties, Magnetic properties, Electrical properties, Tables, Thermodynamics, Oxygen.

The use of liquid alkali metals as a heat transfer medium or motive fluid for power conversion systems has increased significantly in recent years and has created new demands in the area of liquid alkali metal handling technology. Contaminants existing in liquid alkali metal systems may exert deleterious effects on thermophysical properties, corrosivity and handlin characteristics. This paper presents an analytical study on the physicochemical and kinetic aspects of liquid cesium purification, employing the hot gettering technique. The properties and various aspects of handling sodium, potassium, rubidium and cesium are reviewed. Typical sources of contamination are discussed. (Author)

AD-427 343 Div. 17, 26
OTS price $3.60

ITT Research Inst., Chicago, ILL.
DISPERSION-STRENGTHENED VANADIUM ALLOYS.
Final rept., 14 Dec 62-13 Dec 63,
by F. C. Holtz and L. B. Richard. 10 Jan 64,
34p. Rept. no. B6007 6
Contract N600 19 59567
Unclassified report

Descriptors: (*Niobium alloys, Dispersion hardening), (*Vanadium alloys, Dispersion hardening), Titanium alloys, Zirconium alloys, Hafnium alloys, Carbon alloys, Material forming, Melting, Electric arcs, Tantalum alloys, Electron microscopy, Powder metallurgy, Carbides, Oxides, Heat treatment, Hardness, Microstructure, Creep, High temperature research, Mechanical properties, Rolling (Metallurgy), Coatings, Silicides, Recrystallization, Tensile properties.

Vanadium-niobium base alloys containing additions of titanium, zirconium, or hafnium in combination with up to 0.2wt.-% carbon were prepared by arc-melting and fabricated to sheet for elevated temperature creep tests. Compositions based on V-60Nb and containing titaniun or zirconium with carbon had good fabricability, but V-60Nb-1Hf-C and V-40Cb-30Ta-C alloys were difficult to work. Creep tests conducted on siliconized specimens in 2000 F air showed that large carbon additions (0.1 and 0.2wt.-%) produced increased creep rates in V-60Nb base alloys. The most creep resistant composition was V-60Nb-10Ta-1Zr-0.075C which exhibited 1.25% creep in 2.5 hours under a stress of 11, 200 psi. (Author)

AD-427 348 Div. 17, 25
OTS price $3.60

Aeropace Corp., Los Angeles, Calif.
THE MICROPLASTIC BEHAVIOR OF POLYCRYSTALLINE NICKEL,
by R. D. Carnahan and J. E. White. 6 Jan 64,
29p. Rept. no. TDR269 4240 10 5
Contract AF04 695 269
SSD TDR 63 348 Unclassified report

Descriptors: (*Metallic crystals, Nickel), (*Nickel, Deformation), Stresses, Strain (Mechanics), Plasticity, Elasticity, Crystal lattice defects, Photomicrography, Grain structures (Metallurgy), Mechanics, Creep.

A study was undertaken to determine the deformation behavior of polycrystalline nickel of grain sizes from 0.018 to 0.44 mm in the micro-strain region. Deformation was observed to begin at stresses of about 200 psi or 0.1 of the critical resolved shear stress for single crystals. Deformation proceeded in annealed samples by three well developed stages, the nature of each of which was influenced by prior thermo-mechanical treatments. The micro-flow stress in the third stage obeyed a Petch type of grain size dependence; no parabolic hardening behavior was observed. A micro-Bauschinger effect was observed that may be related to the lattice resistance to free dislocation motion. (Author)

AD-427 689 Div. 17, 26
OTS price $3.60

Ladish Co., Cudahy, Wis.
DEVELOPMENT AND STATISTICAL ANALYSIS EVALUATION OF MELTING AND TRANSVERSE PROPERTIES OF HIGH-STRENGTH (H-11 TYPE) STEEL.
Interim engineering rept. no. 5, 6 June-6 Dec 63,
by Joseph C. Truszynski and Jack A. Yoblin.
Jan 64, 36p.
Contract AF33 600 38767; Proj. 7 678
ASD TR7 678, vol 5 Unclassified report

Descriptors: (*Steel, Material forming), (*Material forming, Steel), Melting, Induction heating, Vacuum furnaces, Electric arcs, Heat treatment, Forging, Low pressure research, Tensile properties, Statistical analysis, Landing gear, Structural parts, Aircraft, Hot working, Anisotrophy.

Work accomplished in the initial portion of Phase IV prior to receipt of steel which will be closed-die forged into structural aircraft parts is described. Four heats of material processed by vacuum induction melting followed by vacuum arc remelting were ordered to a specification which requires an average transverse ductility of 12% reduction of area at the 300 to 330 Ksi ultimate tensile strength level. The selected melting process for Phase IV steel was chosen on the basis of its demonstrated capability in Phase III for significantly-reduced mechanical property directionality. The effects upon mechanical properties and property directionality of optimized mill processing, billet size, hot reduction variation, and closed-die forging will be statistically analyzed. (Author)

AD-427 764 Div. 17, 26
OTS price $21.00

Solar, San Diego, Calif.
EVALUATION OF COATED REFRACTORY METAL FOILS.
Rept. for 1 July-30 June 63,
by V. S. Moore and A. R. Stetson. Sep 63, 343p.
Rept. no. RDR1325 4
Contract AF33 657 9443; Proj. 651G
RTD TDR63 4006 pt. 1 Unclassified report

Descriptors: (*Refractory metals & alloys, Foils), (*Foils, Coatings), Molybdenum alloys, Niobium alloys, Titanium alloys, Zirconium alloys, Vanadium alloys, Carbon alloys, Mechanical properties, Oxidation, Fatigue (Mechanics), Ductility, Brazing, Bonding, Diffusion, Resistance welding, Soldering alloys, Silicides, Metal coatings, Spot welding, Microstructure.

An extensive evaluation program was carried out to determine the capabilities of various commercial coating vendors to coat effectively niobium and molybdenum alloy foils (0.006 in.). Two niobium based alloys (D36-Nb-10Ti-5Zr;

17. METALLURGY

AD-427 068 Div. 17, 25
OTS price $1.60

IIT Research Inst., Chicago, Ill.
FRACTURE OF METALS.
Interim rept., 22 Sep-22 Dec 63,
by W. Rostoker. 13 Jan 63, 13p. Rept. no. B183 15
Contract DA11ORD022 3108
Unclassified report

Descriptors: (*Metals, Fracture (Mechanics)), (*Copper alloys, Brittleness), (*Failure (Mechanics), Liquid metals), Beryllium alloys, Carbon alloys, Mercury, Temperature, Time, Diffusion, Stresses.

It is shown that the delayed failure of Be-copper wetted with Hg is accelerated at temperatures above room ambient. Conversely, delayed failure is retarded by simple heating in the unstressed condition to temperatures above 80 C before loading. Cumulative weakening can be erased by these thermal treatments. A mechanism for delayed failure is described in terms of grain boundary penetration by Hg to critical depths defined by the Griffith criterion for fast failure. The rate of penetration is moderated by temperature, stress level, and predisposition of infused Hg. (Author)

AD-427 126 Div. 17
OTS price $2.75

Hughes Tool Co., Culver City, Calif.
MECHANICAL PROPERTIES OF WROUGHT TUNGSTEN.
Rept. for June 60-Dec 61,
by H. Leggett and H. Parechanian. Nov 63, 132p.
Contract AF33 616 7385, Proj. 7381, Task 738103
ASD TDR63 585, vol.1
Unclassified report

Report on Materials Application.

Descriptors: (*Tungsten, Sheets), (*Sheets, Tungsten), Mechanical properties, Tensile properties, Hardness, Microstructure, High temperature research, Test equipment, Stresses, Strain (Mechanics), Temperature, Elasticity, Chemical analysis, Specifications, Tables.

The mechanical properties and quality of commercially available tungsten sheet was investigated. For the initial quality control phase, hardness, microstructure, chemical impurities, flexural properties and tensile strength were determined on material from three sources. Based on these test results a specification requiring high quality material with high cold reduction was formulated. For the second phase of testing three powder lots of tungsten sheet, per the specification, were procured from five sources. The tensile test results on this material are presented for room temperature, 1000, 2000, 3600 and 4400 F. Good correlation between room temperature hardness and tensile strength was found. The material from one producer consistently displayed a limited amount of plastic elongation at room temperature. A third phase was conducted to obtain detailed design data on three lots of material obtained from one producer. These data are reported on separately as Volume II of this report. (Author)

AD-427 128 Div. 17
OTS price $2.50

Marquardt Corp., Van Nuys, Calif.
MECHANICAL PROPERTIES OF WROUGHT TUNGSTEN.
Rept. for Apr 62-Apr 63,
by C. A. Drury, R. C. Kay, A. Bennett and M. J. Albom. Nov 63, 104p.
Proj. 7381, Task 738103
ASD TDR63 585, vol. 2
Unclassified report

Report on Materials Application. Subcontract to Hughes Tool Co., Culver City, Calif., Contract AF33 616 7385.

Descriptors: (*Tungsten, Sheets), (*Sheets, Tungsten), Mechanical properties, Hardness, Creep, Rupture, Tensile properties, High temperature research, Test equipment, Stresses, Strain (Mechanics), Tables, Experimental data Thermal expansion, Elasticity, Tables.

Tensile and creep properties to 5000 F were determined for wrought unalloyed tungsten sheet in order to establish design criteria. Three lots of material, prepared in accordance to the same specification, were used. Hardness and tensile values below 2500 F could be correlated for entire lots of material. Correlation was found at strain rate and hold time versus tensile strength properties or elongation values, at certain temperatures. Properties varied with powder lot to such an extent as to affect design parameters. (Author)

AD-427 131 Div. 17
OTS price $.50

Rock Island Arsenal Lab., Ill.
MULTIMETAL COATING PROCESS FOR COMPOSITE STEEL, MAGNESIUM AND ALUMINUM STRUCTURES.
Interim rept.
by Jodie Doss. 24 Oct 63, 14p.
Proj. 1H024401A110 05
RIAL 63 3471 Unclassified report

Descriptors: (*Aluminum alloys, Coatings), (*Magnesium alloys, Coatings), (*Steel, Coatings), Tin compounds, Phosphates, Corrosion inhibition, Protective treatments, Tin coatings, Phosphate coatings, Composite materials.

Aluminum, steel and magnesium trimetal assemblies were simultaneously coated in order to decrease galvanic corrosion, and to develop coatings to be used for recoating structurally united components containing dissimilar metals. The composite specimens were processed in modified stannous pyrophosphate solutions. The trimetal assemblies containing various alloys of aluminum were also processed in the stannous pyrophosphate solution. Composite specimens containing a large aluminum panel and a small magnesium panel, or the reverse, were processed in the stannous pyrophosphate solution. Solutions containing other tin compounds were investigated as solutions to coat trimetal assemblies. (Author)

AD-427 179 Div. 17, 26
OTS price $1.00

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN ANALYTICAL STUDY ON LIQUID CESIUM PURIFICATION IN VIEW OF CURRENT AND PROJECTED NEEDS,
by Richard H. Herald. Sep 63, 31p.
ASD TDR63 703 Unclassified report

Presented at the ''ASD 1963 Science and Engineering Symposium,'' 18-19 Sep 63, held at Wright-Patterson Air Force Base, Ohio.

Descriptors: (*Cesium, Degasification), (*Liquid metals, Degasification), (*Alkali metals, Degasification), (*Purification, Cesium), (*De-

AD-427 724 Div. 18
OTS price $3.00

General Electric Co., Syracuse, N. Y.
IMPROVED OUTDOOR WARNING DEVICES.
Final rept.
Sep 63, 1v.
Contract OCD OS62 171
Unclassified report

Descriptors: (*Warning systems, Civil defense systems), (*Civil defense systems, Warning systems), Defense systems, Effectiveness, Loudspeakers, Public address systems, Design, Sound, Sound transmission, Noise, Acoustic horns, Sound generators, Noise generators, Recording systems.

The results are presented of a study to determine the extent to which recent technological advances may be applied to outdoor warning, and describes recommendations for applying this information to the design of improved devices. The study consists of (1) a technology review, (2) an investigation of the basic requirements for warning devices and their signals, (3) an evaluation of the effectiveness of current devices, (4) recommendations for new or improved designs, and (5) field tests and evaluation of specific devices. (Author)

AD-427 825 Div. 18, 24, 30, 8
OTS price $8.10

Litton Systems, Inc., Waltham, Mass.
ADAPTIVE MEMORY RESEARCH,
by G. Sebestyen. Nov 63, 83p.
Contract AF30 602 2959, Proj. 5569, Task 556903
RADC TDR63 371 Unclassified report

Descriptors: (*Artificial intelligence, Aerial reconnaissance), (*Pattern recognition, Automatic), (*Aerial reconnaissance, Automation), (*Photo interpretation, Automation), Data processing systems, Bionics, Air intelligence, Target recognition, Photographic images, Statistical analysis, Correlation techniques, Reading machines, Reviews, Air force research.

The state-of-the-art of automatic pattern recognition techniques and related hardware developments is surveyed with special emphasis on the use of the various adaptive memories reported in the literature of late. The intent of this survey is to examine recent developments and techniques for possible use on Air Force intelligence data processing problems. The relationship between pattern recognition problems and Air Force intelligence problems is discusses and the manner in which pattern recognition methods may be applied to these problems is outlined. Most techniques attempt to process a set of simultaneously measured attributes of the input; while there are significant differences in the manner of attribute processing with the various techniques, the major difference between the methods lies in the manner in which a set of attributes are extracted from the physical world. The better-known set of machine learning and recognition techniques are examined, described, and analyzed in a common terminology. The major activities in automatic photographic data processing (target recognition) conducted in various laboratories of the United States are discussed. (Author)

19. NAVIGATION

AD-427 032 Div. 19
OTS price $4.60

Coordinated Science Lab., U. of Illinois, Urbana
DYNAMIC STABILITY OF THE RESONANT CIRCUIT ELECTRICALLY SUPPORTED GYRO,
by Don R. Allen. Aug 63, 43p. Rept. no. R166
Contract DA36 039sc85122
Unclassified report

Descriptors: (*Gyroscopes, Electric fields), (*Gyro stabilizers, Servomechanisms), Stability, Stabilization systems, Magnetic fields, Vacuum, Resonance, Circuits, Spheres, Friction.

The electrically supported gyro is a free, two-axis gyro which employs a spherical metal rotor, shielded from stray magnetic fields and supported without physical contact in ultra-high vacuum by servo-controlled high-voltage electric fields. The rotor is initially accelerated by induction motor techniques but spins freely with virtually no friction during gyro operation. An analysis is made of the static and dynamic properties of a unique rotor support servo called the resonant-support servo. This simple servo consists basically of series resonant circuits formed by connecting a voltage generator and an inductor in series with the capacitance of each support electrode and the rotor. By driving each resonant circuit with a sufficiently high voltage at a frequency higher than its resonance, the rotor can be supported arbitrarily close to the center of the spherical cavity formed by the electrodes. Because of the resonant-support servo is dynamically unstable, three general methods of stabilizing the servo are described and analyzed. (Author)

AD-427 269 Div. 19
OTS price $1.60

Navy Electronics Lab., San Diego, Calif.
ESTIMATING THE ACCURACY OF NAVIGATION SYSTEMS. A STATISTICAL METHOD OF DETERMINING CIRCULAR ERROR PROBABLE,
by E. R. Swanson. 24 Oct 63, 16p.
NEL 1188 Unclassified report

Descriptors: (*Position finding, Hyperbolic navigation), (*Hyperbolic navigation, Circular error probable), Errors, Statistical distributions, Radio navigation.

A statistical method of estimating the fix accuracy of a navigation system is described. The method is directly applicable to the design or evaluation of hyperbolic systems such as Omega and Loran. It consists of applying a knowledge of system geometry and a simple estimate of the statistical repeatability of measurement to find the circular error probable in a navigational fix. The circular error so determined should be used with caution because it does not account for fixed errors such as map errors. The method was successfully used in evaluation studies of the present Omega network. This report contains an illustrative example of this application. (Author)

AD-427 721 Div. 19
OTS price $2.50

Radio Corp. of America, Los Angeles, Calif.
ACCURATE DME FOR USE WITH ILS.
Final rept.,
by Charles J. Hirsch. 15 Nov 63, 1v.
Contract ARDS585; Proj. 115 1 13D
Unclassified report

Descriptors: (*Distance measurement equipment, Radio navigation), (*Instrument landings, Radio navigation), (*Radio navigation, Airborne), Transponders, Electromagnetic pulses, Radio-frequency pulses, Radio equipment, Radio receivers, Radio transmitters, Errors, Radio interference, Coding, Pulse transmitters.

B66-Nb-5Mo-5V-1Zr) and one molybdenum based alloy (TZM-Mo-0.5Ti-0.08Zr--0.02C) were included. Nine coating vendors participated in the program. Tests performed in the program were receiving inspection (metallography, weight change, gross effects, and microhardness), mechanical properties at room temperature, bend ductility, ductile-brittle transition temperature, cyclic oxidation resistance in a furnace with and without prestraining and in a plasma-torch flame at 5 and 760 Torr, diffusion rates, creep, and fatigue life. The results of these tests show that foils can be coated to provide oxidation resistance for periods of time up to 75 hours at 2500 F without gross loss in mechanical properties. (Author)

AD-427 798 Div. 17
OTS price $5.60

Thompson Ramo Wooldridge Inc., Cleveland, Ohio.
DESIGN DATA STUDY FOR COATED COLUMBIUM ALLOYS.
Bimonthly rept. no. 4, 1 Sep-1 Nov 63,
by D. B. Warmuth. 1 Dec 63, 52p. Rept. no. TM 3831 67
Contract NOw63 0471c, Proj. 512 002292 88
Unclassified report

Descriptors: (*Niobium alloys, Refractory coatings), (*Refractory coatings, Oxidation) Mechanical properties, Heat shields, Aero space craft, Structural parts, Design, Data, High temperature research, Tensile properties, Creep, Sheets, Microstructure, Molybdenum alloys, Vanadium alloys, Zirconium alloys, Tungstan alloys, Carbon alloys.

A portion of the Design Data Study mechanical property tests on Pfaudler and TRW coated 30 mil B-66 and D-43 niobium alloy sheet has been completed. Data are presented from one atmosphere cyclic oxidation tests at 1600, 2300 and 2600 F. These data are compared with the results of tests conducted in the preliminary evaluation phase of the program. Tensile data for both uncoated and coated sheet are reported for the temperature range room temperature to 2300 F. The tensile behavior of coated B-66 and D-43 alloy sheet is discussed relative to the behavior of uncoated sheet. Preliminary results of creep tests is air conducted on coated B-66 and D-43 alloy sheet are presented. Tests have been conducted at 2000 and 2300 F. A few generalized statements of the creep behavior of these coated alloys are presented. (Author)

AD-427 876 Div. 17, 26
OTS price $5.60

Northrop Corp., Hawthorne, Calif.
DEVELOPMENT OF IMPROVED METHODS, PROCESSES, AND TECHNIQUES FOR PRODUCING STEEL EXTRUSIONS.
Interim engineering rept. no. 18, 1 Oct-31 Dec 63,
by L. M. Christensen. Dec 63, 51p. Rept. no. 64 9
Contract AF33 600 36713
Unclassified report

Descriptors: (*Steel, Extrusion), (*Stainless steel, Extrusion), Material forming, Drawing (Machine processing), Dies, Metal forming presses, Furnaces, Lubricants, Glass, Temperature, Surface properties, Microstructure.

Phase III was instituted at Babcock & Wilcox with the aim of duplicating the technology developed at Allegheny Ludlum as completely as possible. Detail plans were formulated for the new shape involved in Phase III. This included designing new extrusion dies, new draw dies, new liner, billet handling equipment, etc. Procurement and fabrication of items for both extruding and warm drawing was completed. The first Phase III, experimental extruding effort was accomplished and details are included. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-427 071 Div. 18, 26, 32
OTS price $9.10

RAND Corp., Santa Monica, Calif.
INFORMATION REQUIREMENTS FOR INTEGRATED SUPPLY SUPPORT: AN INFORMATION ANALYSIS CASE STUDY,
by H. W. Nelson and W. V. Shelton. Jan 64, 101p.
Contract AF49 638 700
Unclassified report

Descriptors: (*Logistics, Management engineering), (*Management engineering, Logistics), Maintenance, Procurement, Costs, Theory, Design, Life support, Operation, Transportation, Maintenance equipment, Analysis, Distribution (Economics), Tables.

This Memorandum discusses the management information required to support a responsive, integrated supply-support system. Emphasis is placed on the examination of policy intent in order to establish the value of information. To provide specific guidance for management information system design, it is impossible to discuss performance criteria realistically out of context of its association as a component of management, and as a resource related to alternative resources. The requirements computation process is of central importance in integrated support operations. Management capability is a resource of the logistic system. Within a defined range, this resource is an alternative to such other resources as inventory, repair, or transportation in providing a given level of support. Management capability is, in most instances, less expensive than the alternative resources. Management capability is a function of the policies structure and the supporting management information system. Both of these ingredients are essential, neither alone is sufficient. The information foundation is a prerequisite to attaining the potential support value available from integrated support operations. On the other hand, unless support operations are viewed as an integrated process, the necessary information structure cannot be defined. (Author)

AD-427 148 Div. 18
OTS price $1.10

RAND Corp., Santa Monica, Calif.
THE IMPACT OF CHANGING DEFENSE ON LOGISTICS REQUIREMENTS.
by Murray A. Geisler. Dec 63, 9p. Rept. no. P2845
Unclassified report

Descriptors: (*Logistics, National defense), (*National defense, Logistics), Costs, Effectiveness, Military requirements, Survival, Disarmament, Military organization, Defense systems.

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-427 020 Div. 20, 6
OTS price $9.10

Technical Military Planning Operation, General Electric Company, Santa Barbara, Calif.
ELECTROMAGNETIC BLACKOUT GUIDE EFFECTS OF HIGH ALTITUDE NUCLEAR BURSTS ON ELECTROMAGNETIC WAVES, VOLUME I.
1 May 61, 1v. Rept. no. RM61TMP14
Contract DA49 146XZ038
DASA 1229 Unclassified report

Descriptors: (*Nuclear explosions, Electromagnetic waves), High altitude, Magnetic fields, Ionospheric disturbances, Low altitude, Air bursts, Ionization, Absorption spectrum, Radar interference, Radar jamming, Radio interference, Radio jamming, Communication systems, Vulnerability, Noise (Radio).

The Electromagnetic Blackout Guide describes the quantitative relationships between nuclear explosions at various altitudes, geographic locations and yields and the absorptive and refractive effects produced as a function of time, space and frequency. This guide provides quantitative data for war games and for evaluating communication systems and weapon systems. (Author)

AD-427 282 Div. 20, 25
OTS price $5.60

Naval Research Lab., Washington, D. C.
NRL QUARTERLY ON NUCLEAR SCIENCE AND TECHNOLOGY. Progress rept. July-Sep 61.
1 Oct 61, 52p.
Unclassified report

Descriptors: (*Nuclear physics, Differential cross section), High temperature research, Deuterons, Nitrogen, Isotopes, Tritium, Elastic scattering, Nuclear energy levels, Quantum mechanics, Reactor safety systems, Gamma rays, Radiation monitors, Steel, Corrosion inhibition, Monte Carlo method, Diffusion.

Contents: Differential cross sections of the N14(t, alpha)C13 reactions; Differential cross sections of the N14(t, d sub 0)N15 reaction; Differential cross sections for tritium-induced reactions on C12; The C12(gamma, 3 alpha) reaction below 21.5 Mev; Diffusion from a hemispherical source of slow neutrons.

AD-427 363 Div. 20
OTS price $26.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROTECTION FROM RADIOACTIVITY,
by S. N. Ardashnikov and S. M. Gol'din.
13 Sep 63, 533p.
FTD TT62 1692 Unclassified report

Trans. from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Literatury Po Chernoy i Tsvetnoy Metallurgii, pp. 1-420, 1961.

Descriptors: (*Radiobiology, Nuclear physics), (*Nuclear particles, Shielding), Neutrons, Dosage, Measurment, Radioactive isotopes, Dosage, Contamination, Radiation measurement systems, Electronic equipment, Electronics.

The book considers questions of protection against radioactive radiation from the physical, chemical, and biological points of view. Commercial electronic dosimetric apparatus and procedures for its use are described. Information is presented on the principles of nuclear physics and electronics needed by a reader who is not specially trained in these fields. The book is intended as a text for students in mining-metallurgy of other special-ties connected with the use of radioactive isotopes and radiation, and also for engineering-technical workers. (Author)

AD-427 395 Div. 20
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE INDIUM-GALLIUM RADIATION LOOP OF THE IRT NUCLEAR REACTOR,
by A. Kh. Breger and Yu. S. Ryabukhin.
26 July 63, 15p.
FTD TT63 553 Unclassified report

Trans. from Indiy-Galliyevyy Radiatsionnyy Kontur Yadernogo Reaktoro IRT, 8-12, pp. 1-15, Sep 59.

Descriptors: (*Nuclear reactors, Isotopes), Indium, Gallium, Gamma rays, Theory, Eutectics, Neutrons, Alloys, Energy, Shielding, Electromagnetic pumps, Generators, Power, Resonance, Theory, Distribution, Equations.

AD-427 405 Div. 20
OTS price $2.60

North Carolina U., Chapel Hill.
RADIATION DETECTION BY DECORATION IN SILVER CHLORIDE CRYSTALS,
by Charles B. Childs and Lawrence M. Slifkin.
1963, 29p.
Contract AF49 638 865
AFOSR J1553 Unclassified report

Descriptors: (*Silver, Halides), (*Etched crystals, Crystal lattice defects), Single crystals, Bromides, Chlorides, Surfaces, Photoelectrons, Crystal growth, Detection, Cosmic rays, Photographic emulsions, Nuclear particles, Proton reactions.

A review is given of the decoration of imperfections in silver halides with emphasis on volume decoration used in radiation detection. The selection, preparation, and decoration of silver chloride crystals are discussed with illustrations of decorated imperfections. Examples of primary cosmic ray particles and high energy proton collisions in silver chloride crystals are presented. The unique features of these crystals as radiation detectors are absence of humidity effects, absence of distortion, non-chemical development at room temperature, delineation of tracks in less than two hours, and crystal thicknesses greater than 3000 microns. (Author)

AD-427 558 Div. 20, 2
OTS price $1.10

Ohio State U. Research Foundation, Columbus.
INVESTIGATION OF ATMOSPHERIC IMPURITIES. Quarterly status rept., 1 Dec 60-28 Feb 61,
by Dudley Williams. 17 Mar 61, 3p. Rept. no. 22
Contract Nonr49510, Proj. NR014 406, RF Proj. 656
Unclassified report

Descriptors: (*Nuclear magnetic resonance, Spectrophotometers), (*Paramagnetic resonance) Charged particles, Nuclear resonance, Resolution, Amino acids, Proteins, Paramagnetic materials, Instrumentation, Single crystals, Sensitivity.

Division 19 - NAVIGATION

This report evaluates the effect on the accuracy of DME, especially in the presence of echoes, of using pulses which rise more rapidly than the standard Tacan pulses without causing improper operation in the adjacent channels. Fruit and identification signals were found to affect the accuracy significantly and a study of these effects was added to the investigation. This report proposes an ILS-DME transponder capable of receiving and emitting sharply rising pulses. To obtain the maximum accuracy from the system, it is proposed to provide the airborne DME with the same capacity. The proposed airborne DME will operate also with currenly installed enroute transponders, and vice versa. (Author)

Tanks (Combat vehicles), Protective coverings, Feasibility studies, Explosive actuators, Nuclear weapons.

An Explosive Lens Flashblinder (ELF) system was investigated for use in the model XM 38 tank periscope. The purpose of the device is to protect the eyes of a viewer from the damaging effects of intense radiation in the visible and infrared portions of the spectrum caused by nuclear detonations. The ELF system, which employs and explosive train to drive an opaquing material into a void between two lenses, was incorporated into experimental anti-flash shutters. A special test apparatus called a dynamic optical densitometer was used to measure the time required for the experimental units to reach various optical densities. Tests were also conducted to evaluate the structural strength of of the design, the characteristics of the opaquing material, and the operating efficiency at low temperature. As a result of the tests a successful shutter was designed which utilized an offset by-pass, modified implosion system. It was concluded that the final design, which achieved an average occlusion time of 113 microseconds, successfully demonstrated the feasibility of the anti-flash shutter, although further refinements to the device are recommended. (Author)

AD-427 793 Div. 22, 18
OTS price $6.60

Ohio State U., Columbus.
THE TANK WEAPON SYSTEM.
Progress rept. 1 July-31 Dec 63.
31 Dec 63, 62p. Rept. no. RF573PR64 1
Proj. RF573
Unclassified report

Descriptors: (*Tanks (Combat vehicles), Design), (*Military requirements, Analysis), Shear stresses, Weapon systems, Military tactics, Reliability, Performance (Engineering), Trafficability, Soil mechanics, Terrain, Effectiveness, Probability, Firing mechanisms (Weapon), Gun turrets, Targets, Detection.

Attention has been focused on the development of relationships to predict the mobility and firepower characteristics of future tanks with specified hardware components. Research in the areas of soft-soil agility and cross-country mobility is presented. An analysis of the effects of cant on accuracy of the tank main gun is reported, and work in target detection and first-round firing time is described. The initial formulation of a tactical performance model for tank units is explained. (Author)

23. PERSONNEL AND TRAINING

AD-427 029 Div. 23, 30
OTS price $11.00

Mitre Corp., Bedford, Mass.
FIRST CONGRESS ON THE INFORMATION SYSTEM SCIENCES. SESSION 14. AUTOMATED INSTRUCTIONAL TECHNIQUES.
Nov 63, 142p. Rept. no. SS 14
Contract AF33 600 39852, Proj. 704
ESD TDR63 474 14 Unclassified report

Descriptors: (*Data processing systems, Education), (*Education, Computers), (*Teaching machines, Linear programming), Teaching machines, Education, Computers.

A sample manual linear teaching exercise is presented, and the differences between it and branching programs are explained by examples and flow charts. The use of computer-based instructional systems is discussed, and the three major situations which would justify the extra cost and complexity of computer equipment are covered in detail. These situations include: (1) research, where practical applicability is not a major consideration; (2) special teaching problems, where the efficiency of the system outweighs equipment cost considerations; and (3) the use of special-purpose, realistically-priced equipment or time-sharing the use of a higher-priced centralized system where the programs reach a large number of students. The paper concludes with a brief forecast of the future of computer-based instructional systems. A concept of computer teaching is introduced, and experimental methods, equipment, and results are used to form a framework for discussion. The view-point is taken that a conversational interaction or feedback takes place between the student and teacher, human or computer, making learning much easier. The use of large, high-speed, general purpose, digital computers as teaching machines is discussed as an introduction. (Author)

AD-427 152 Div. 23, 32
OTS price $1.60

System Development Corp., Santa Monica, Calif.
A LONG-RANGE EDUCATIONAL ANALYSIS AND PLANNING PROGRAM FOR AMERICAN EDUCATION,
by John F. O'Toole, Jr. 5 Dec 63, 17p. Rept. no. SP 1464
Unclassified report

Presented at the American Society of Training Directors, Pacific Riviera Chapter meeting, 16 Dec 63, at Los Angeles, California.

Descriptors: (*Education, Analysis), Decision making, Government employees, Test methods, Effectiveness, Sociology, Operation, Population, Training, Professional personnel, History, Economics

This report outlines a suggested program of long-range educational analysis and planning for American public education during the 1965-1985 time period. It suggests that systems analysis techniques be applied to education for long-range planning purposes. Describes the use of such techniques as a means of assessing the value of alternative methods of meeting quantitative demands and the need for quality improvements in education, as well as a set of priorities for implementation during the next decades. Systematizes a method whereby new educational media could be evaluated with sufficient validity to be useful for top-level decision makers in education and government at the local, state and federal levels. Lists objectives and possible outcomes from the systems analysis studies. Concludes that results obtained from the suggested educational analysis and planning program would provide data which are presently unavailable. (Author)

AD-427 546 Div. 23, 30
OTS price $3.60

American Inst. for Research, Palo Alto, Calif.
COMPLEXITY OF TYPOGRAPHICAL CUEING IN PROGRAMED AND CONVENTIONAL TEXTS,
by Wayne A. Hershberger and Donald F. Terry.
Dec 63, 31p. Rept. nos. AIR C28 12 63TR; TR7
Contract Nonr307700
Unclassified report

AD-427 654 Div. 20
OTS price $1.10

Johns Hopkins U., Baltimore, Md.
(No title).
Final rept., 1 Jan-31 Dec 62.
Nov 63, 6p.
Grant AF AFOSR62 134
AFOSR J1446 Unclassified report

Descriptors: (*Nuclear physics laboratories, Mesons), Bubble chambers, Synchrotrons, Strange particles, Deuterium, Pions, Mass spectrum, Leptons.

AD-427 795 Div. 20
OTS price $1.10

Maryland U., College Park.
MANY-BODY PROBLEM.
Rept. for Dec 62-Dec 63,
by Richard A. Ferrell. 31 Dec 63, 9p.
Contract Nonr1797 00
Unclassified report

Descriptors: (*Nuclear physics, Bibliographies), (*Bibliographies, Nuclear physics), Bremsstrahlung, Isotopes, Nuclear spins, Nuclear resonance, Theory, Dynamics, Erbium, Nucleons, Damping, Vibration, Rotation, Nuclear reactions, Photonuclear reactions, Analysis.

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-427 049 Div. 22, 1
OTS price $3.60

Hughes Tool Co., Culver City, Calif.
20MM MK 4 MOD 0 GUN POD FLIGHT TEST OF THREE PODS INSTALLED ON A4 AIRPLANE AT NAVAL ORDNANCE TEST STATION CHINA LAKE, CALIFORNIA. 15 APRIL TO 20 JULY 1963.
20 July 63, 35p. Rept. no. 63 56
Unclassified report

Descriptors: (*External stores, Aircraft guns), (*Aircraft guns, Attack bombers), Installation, Flight testing, Propellant flashes, Blast, Vibration, Noise, High altitude, Acceleration, Temperature, Ice, Handling, Firing tests (Ordnance).

Tests demonstrated that one, two, or three 20mm Mk 4 gun pods can be installed, flown, and fired from the A4 airplane without aircraft structural changes or added flight restrictions. The three-pod installation increased the firepower capability of the A4 airplane to 12,600 shots-per-minute. Pilots reported no adverse flight conditions during any flight maneuver and no adverse effects to control functions during either symmetrical or asymmetrical firing of a multiple pod system. Vibration and muzzle blast effects were at an acceptable level. Peformance was the same as that with comparable inert stores. Operational limits were pushed upward during these tests above those previously used for a single pod installation. Firing was accomplished under accelerations of 5.5G, a 50% increase. Burst length was increased to a four-second maximum in flight. Firepower was increased to 12,600 shots per minute, a 300% increase. Rounds capacity was increased to 2250, a 300% increase. The successful operation of the Mk 4 pod under high altitude, low temperature and icing conditions (cold-sweat-cold) and during sustained speeds within a range of 280 - 450 KIAS was demonstrated. (Author)

AD-427 074 Div. 22
OTS price $4.60

General Electric Co., Burlington, Vt.
FLUID TIMER FOR ORDNANCE APPLICATIONS.
Quarterly rept. no. 1,
by E. B. Krulewich and J. N. Shinn. 9 Oct 63, 43p. Document no. 64APB1
Contract DA19 020AMC0213, Department of Army proj. IR542709 D 362
Unclassified report

Descriptors: (*Time-interval counters, Arming devices), (*Arming devices, Timing devices), (*Time-delay fuzes, Fluids), Counting methods, Digital systems, Temperature, Sensitivity, Jets, Pressure, Epoxy plastics, Glass, Time-delay fuzes, Gases.

A fluid timer demonstrator is described which uses fluid amplifiers for operation and thus has no moving parts. Activity during the first quarter has been on determining the optimum matching of an amplifier element to a binary counter element. The work also included the testing of a fluid amplifier oscillator over a temperature range of -65 to 165F to determine its temperature sensitivity. The oscillator frequency was approximately proportional to the square root of temperature. (Author)

AD-427 102 Div. 22
OTS price $1.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
EFFECT OF A BARE EXPLOSIVE AGAINST A METAL PLATE,
by Sidney Kravitz and Louis Wiesenfeld. Nov 63, 8p.
PA TM1310 Unclassified report

Descriptors: (*Explosion effects, Metal plates), Mathematical prediction, Beams (Structural), Deformation, Equations, Least squares method, Curve fitting, PETN.

A semi-rational formula is developed for measuring the effects of a bare explosive against a metal plate. A comparison with an experiment shows good agreement. The purpose of this report is to derive a simple formula to predict the relative effect of a given explosive against beams of different dimensions and different materials. (Author)

AD-427 262 Div. 22
OTS price $3.60

Bermite Powder Co., Saugus, Calif.
FEASIBILITY STUDY OF THE EXPLOSIVE LENS ANTI-FLASH SYSTEM FOR USE IN FIRE CONTROL OPTICAL INSTRUMENTS.
Final rept.,
by E. M. Lowry. July 63, 30p. Rept. no. 330
Contract DA04 495AMC1A
Unclassified report

Descriptors: (*Lenses, Nuclear explosions), (*Periscopic gun sights, Flashblindness), Automatic, Radiation injuries, Eye, Optical instruments, Fire control system components, Explosive trains, Optical filters, Infrared filters, Light transmission, Optical sights,

Interim engineering rept. no. 5, 15 Aug-15 Dec 63,
by G. C. Brock, E. P. Myskowski, and W. L. Attaya. 15 Dec 63, 25p. Rept. no. 9048 5
Contract AF33 657 9158
Unclassified report

Descriptors: (*Photographic reconnaissance, Photographic images), (*Aerial photography, Photographic analysis), Photographic lenses, Photographic film, Optical images, Optical analysis, Wave analyzers, Resolution, Effectiveness, Models (Simulation), Photo interpretability, Tests.

An investigation was conducted to develop techniques whereby modern methods of image evaluation can be applied to the specification testing and analysis of reconnaissance systems. Work has continued on the measurement of optical transfer functions and the analysis of the formal target images associated with the simulated aerial photography. (Author)

25. PHYSICS

AD-427 003 Div. 25
OTS price $4.60

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
INVESTIGATION OF NEW CONCEPTS FOR MICROWAVE POWER GENERATION (PLASMA STUDIES).
Final rept.
Dec 63, 1v.
Contract AF30 602 2833, Proj. 5573, Task 55 7303
RADC TDR63 465, vol. 1 Unclassified report

Descriptors: (*Plasma physics, Electron beams) (*Test vehicles, Design), Programming (Computers), Gas discharges, Electron guns, Microwave frequency, Oscillation, Vacuum pumps, Power, Oscillation, Brillouin zones, Perturbation theory, Electric fields, Magnetic fields, Cavity resonators, Gas ionization, Transport properties, Solenoids.

The design and construction, and preliminary experimental results, of a test vehicle for studying plasma electron beam interaction are described in associated Report A. Two connected chambers of the test vehicle, one at hydrogen pressures as high as 1/1000 Torr for generation of plasma and the other at pressures less than 1/100,000 Torr for the generation of a high-power electron beam in a convergent flow gun, are described. A demountable subassembly for generating the plasma and directly coupling S-band signals to and from the plasma and the electron beam by means of a cavity is described. The use of the cavities to diagnose the plasma is described in part, with a more detailed description being presented in associated Report B. The electron gun used to generate the 5-kv unity microperveance beam, having 0.20 in. diam. in semi-confined flow, is described. This beam is passed from the low-pressure gun chamber into the high-pressure plasma chamber. A beam scanner for studying the properties of the electron beam in the gas and plasma environment is also described. Use of this scanner to study the ion-induced beam oscillation is described in associated Report C. (Author) (U)

AD-427 005 Div. 25
OTS price $2.60

Spectrolab, Inc., Sylma9, Calif.
DESIGN AND FABRICATION OF OPTICAL FILTERS FOR LASER FREQUENCY.
Quarterly progress rept. no. 3, 10 Aug-9 Nov 63, by Samuel J. Holmes and Noel Bowman. 3 Dec 63, 26p.
Contract AF33 657 9216
Unclassified report

Descriptors: (*Optical filters, Mica), (*Lasers, Design), Coatings, Sodium compounds, Aluminum, Fluorides, Zinc compounds, Sulfides, Absorption, Measurement, Refractive index, Polarization, Temperature, Sensitivity, Tuning devices.

During the period of the past quarter, activity was devoted to various experimental efforts to optimize the basic mica interference filters. From the experimental results, it is now possible to predict the optimum characteristics of the filters that can be obtained from the present type of mica. The final performance of any mica filter is limited only by the optical properties of the mica, for example, absorption and uniformity. Indian pale green mica is reported to have the highest transmission coefficient for any natural mica. Using the measured optical properties of this mica, calculations were made to determine the optimum filter configuration. For the experimental filters, mica half-wave plates coated on both sides with five alternate layers of zinc sulfide and cryolite have been used. The theoretical bandwidth of this type of filter configuration is 0.8 A, and the expected transmission is in the order of 75% without any auxiliary filtering. For a filter employing reflecting stacks of less layers the transmission is higher but the rejection of the background outside the passband is much less. (Author)

AD-427 007 Div. 25
OTS price $11.50

Michigan U. Coll. of Engineering, Ann Arbor.
THE INFLUENCE OF A COMPRESSIBLE BOUNDARY ON THE PROPAGATION OF GASEOUS DETONATIONS.
Technical rept.,
by E. K. Dabora. Dec 63, 140p. Rept. no. 05170 1 T,
Grant DA AROD31 124G345, Proj. 3559E
AROD 3559 1 Unclassified report

Descriptors: (*Gases, Detonation waves), (*Detonation waves, Gases), Shock waves, Explosion effects, Controlled atmospheres, Helium group gases, Shock tubes, Stability, Velocity, Photographic analysis.

Theoretical analysis shows that a detonation wave in a gaseous explosive bounded by an inert gaseous medium propagates at a lower velocity than it would have if the explosive were inside a tube with a solid wall. The velocity decrement is found to be dependent primarily on the ratio of the initial densities of the explosive and the inert gases, the reaction length of the explosive and the extent of the explosive normal to the interface. An extension of composition limit criteria shows that there is a limit to the velocity decrement beyond which the detonation is expected to quench and therefore deteriorate into a shock. Extensive experimental results on H2-O2 mixtures bounded by nitrogen and some results on stoichiometric CH4-O2 bounded by different gases show a general agreement with theory. (Author)

AD-427 019 Div. 25, 4
OTS price $3.60

Sheffield U., (Gt. Brit.).
DECAY OF THE TRIPLET STATE.

Original contains color plates: All DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Textbooks, Programming (Computers)), (*Printing, Textbooks), Reading, Time, Analysis, Statistical analysis, Teaching machines.

The purpose of the present study was to examine further the findings of a previous study reported by Hershberger, 1963b. Adding self-evaluational test items to the lessons significantly increased learning for both the cued and noncued versions of the texts. The three specific hypotheses tested in the present study were: (1) Complex typographical cueing, distinguishing five categories of lesson content, demands the flexibility of reading style characteristic of only the able reader. (2) Detailed reading instructions are necessary if even the able reader is to utilize properly complex typographical cueing. (3) A simple cueing scheme distinguishing two categories of lesson content will be more effective than (a) no cueing, or (b) a complex cueing scheme distinguishing five content categories. The effects of reading ability, reading instructions, and cueing complexity were assessed using both conventional and programed texts. (Author)

AD-427 752 Div. 23, 28, 30
OTS price $1.60

System Development Corp., Santa Monica, Calif.
PURPOSE AND STRATEGY OF THE SCHOOL SIMULATION PROJECT,
by John F. Cogswell, Robert L. Egbert, Donald G. Marsh and Frank A. Yett. 19 Dec 63, 14p.
Technical memo. 1493 101 00
Grant 714 9120 217
Unclassified report

Descriptors: (*Education, Simulation), (*Models (Simulations), Education), Data processing systems, Automation, Training, Operation, Computers, Programming (Computers), Students, Personnel, Mathematical models, Analysis, Design.

The purpose and strategy of the School Simulation Project are defined. This project aims to use analysis and simulation of school organization to investigate organizational modifications in education that will help implement instructional innovations. Five high schools varying in the extent to which they are innovating are being selected for analysis. In addition, a computer-based simulation vehicle will be constructed that will serve as a conceptual tool for generating research hypotheses about ways in which school design and organization can be improved, and for provisionally testing the implications of these hypotheses. Seven tenets, developed in the course of defining the study, are listed and discussed. The flow of study procedures and the interactions between these procedures are discussed. (Author)

AD-427 777 Div. 23
OTS price $.50

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
A PORTABLE PRESENTATION PACKAGE FOR AUDIO-VISUAL INSTRUCTION,
by Edgar A. Smith, Ralph E. Roberts and William E. Brady. Nov 63, 15p.
Proj. 1710 Task 171007
AMRL TDR63 91 Unclassified report

Report on Training, Personnel, and Psychological Stress Aspects of Bioastronautics.

Descriptors: (*Television equipment, Training devices), (*Training devices, Television equipment), Mobile, Recording systems, Magnetic tape, Display systems, Remote control systems, Films, Film projectors, Cameras, Counter insurgency.

The Portable Presentation Package is a prototype of a self-contained package of audio and visual equipment designed to facilitate technical training particularly in (1) remote areas, (2) situations in which written communications are difficult, and (3) situations requiring rapid on-the-spot preparation of instructional material. The package contains the essential components required in preparing and giving visual and audio-visual presentation to small groups. The major criteria employed in developing the package were that (1) the equipement be easily portable by one man, (2) it utilize off-the-shelf items presently available through established commercial channels, and (3) components be assembled as modules to allow replacement or substitution as units without interference with other components. The Portable Presentation Package is only slightly larger than an attache case, weights 23 pounds, includes camera with light meter, projector with remote controls and supplementary lenses, projection screen, tape recorder and the necessary power cords and mirrors, and additional film and magnetic tapes. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-427 759 Div. 24, 30, 2, 18
OTS price $5.60

Brown, D., Associates, Inc., Eau Gallie, Fla.
PHOTOGRAMMETRIC MATHEMATICAL TARGETING RESEARCH.
Nov 63, 47p.
Contract AF30 602 3007; Proj. 5569; Task 556902
RADC TDR63 476 Unclassified report

Descriptors: (*Photogrammetry, Digital computers), (*Aerial photography, Mapping), Position finding, Errors, Corrections, Programming computers, Mathematical analysis, Data processing systems.

The results of an investigation of numerical and electronic computer techniques for solving the large system of normal equations arising from analytical photogrammetric multiple-station aerotriangulation are presented. Four different internal arrangements of the normal equations; three point-iterative and two block-iterative procedures for solving the normal equation system; and compacting of the normal equations are discussed, and results of tests of the various possible combinations of equation arrangements and iterative techniques are presented. Results reveal a particularly attractive solution technique which provides an efficient, economical, and accurate means of performing this type of adjustment; and results in a nearly linear proportional increase in the computer time required as the number of photographs is increased. (Author)

AD-427 806 Div. 24
OTS price $2.60

Itek Corp., Waltham, Mass.
STUDY OF IMAGE-EVALUATION TECHNIQUES.

AD-427 088 Div. 25
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
VIBRONIC SPECTRA OF SrF2:Sm2+ AND BaF2:Sm2+,
by Isaac Richman. 22 Nov 63, 11p. TDR169 3250 24 TN3
Contract AF04 695 169,
SSD TDk63 297 Unclassified report

Descriptors: (*Electronic transitions, Selection rules), Line spectrum, Raman spectroscopy, Strontium compounds, Barium compounds, Fluorides, Samarium compounds, Single crystals, Crystal lattices, Atomic energy levels, Vibration.

A model using Born-von Karmann boundary conditions, which predicts the number of vibronic satellites and the k = 0 selection rules, is proposed in this report. It is shown however that the k = 0 selection rules are too restrictive to explain the vibronic spectrum and that to obtain a satisfactory explanation transitions involving vibrations away from k = 0 must be considered. The model, when such transitions are taken into account, is shown to be consistent with the observed data. It is p9oposed that one of the modes observed in the vibronic spectrum corresponds to vibrations of the transverse optical branch, a second to the longitudinal optical branch, and a third to transitions away from k = 0 involving the Raman active branch. This model is able to qualitatively explain the differences observed in the two host lattices. (Author)

AD-427 093 Div. 25, 8
OTS price $9.60

Philco Corp., Blue Bell, Pa.
SOLID-STATE APPLICATION STUDY,
by M. Heil, S. T. Fisher, and P. M. W. Nave.
Dec 63, 1v.
Contract AF30 602 3037, Proj. 5573, Task 557303
RADC TDR63 493 Unclassified report

Descriptors: (*Semiconductors, Plasma oscillations), (*Solid state physics, Electromagnetic waves), (*Plasma physics, Semiconductor devices) Propagation, Phonons, Metal films, Dielectrics, Indium alloys, Antimonides, Hall effect, Electron beams, Statistical functions, Electrons, Excitation, Millimeter waves, Backward-wave oscillators, Traveling-wave tubes, Equations, Integral equations.

A theoretical and experimental investigation was made of the plasma-like properties of the charge carriers in solid-state materials to determine the feasibility to utilizing this pseudo plasma for amplication and generation of electromagnetic energy. The following types of waves are considered: (1) slow transverse electromagnetic waves (helicon waves and extensions thereof), (2) longitudinal electric waves (plasma waves), and (3) fast transverse electromagnetic waves. It is shown that helicon waves are theoretically capable of being amplified in semiconductors at frequencies of the order of 10 to the 7th power cps or lower. Longitudinal plasma-wave instabilities remain of great interest, but have never been observed in semiconductors. It is shown that fast wave amplification is not possible where the dc magnetic field, the dc electric field, and the wave vector k are mutually parallel, and where a shifted Maxwellian is assumed for the velocity distribution function. Other distribution functions and field configurations remain to be evaluated. A Hall-effect experiment has yielded useful information about the energy dependence of the electron mobility of InSb. (Author)

AD-427 095 Div. 25
OTS price $4.60

Laboratory for Atmospheric and Space Physics, U. of Colorado, Boulder.
REFLECTIVITY OF METALS IN THE EXTREME ULTRAVIOLET,
by Wilfred Theisen. Dec 63, 38p. Rept. no. SR3
Contract AF19 628 287, Proj. 8627, Task 862703
AFCRL 63 927 Unclassified report

Descriptors: (*Metals, Optical properties), (*Ultraviolet spectroscopy, Metals), Solid state physics, Reflection, Ultraviolet radiation, Ultraviolet equipment, Ultraviolet spectrophotometers.

AD-427 099 Div. 25, 4
OTS price $8.10

Naval Ordnance Lab., Corona, Calif.
FOUNDATIONAL RESEARCH PROJECTS.
Quarterly rept., July-Sep 63.
15 Dec 63, 1v.
NAVWEPS 8171 Unclassified report

Descriptors: (*Scientific research, Reports), (*Heat resistant plastics, Synthesis (Chemistry), (*Atomic spectroscopy, Scientific research), (*Spectra (Infrared), Scientific research), (*Semiconductors, Scientific research), Organic phosphorus compounds, N-heterocyclic compounds, Solar eclipses, Lasers, Ruby, Attenuation, Atmosphere, Exhaust gases, Fermions, Optical properties, Refractive index, Electromagnetic waves, Boundary layer, Absorption spectra, Films, Lithium compounds, Hydroxides, Dielectrics, Solid state physics.

Contents: High Temperature Polymer Program -- Synthesis and Evaluation of Linear Phosphonitriles; Synthetic Studies; IR Atomic Spectra -- Observation of the Total Solar Eclipse of 20 July 1963; Laser Program -- Radiationless Transition in Ruby; Radiation Analysis -- Attenuation of Hot Gas IR Radiation by the Atmosphere; Semiconductor Physics -- Internal Localization of the Zero-Temperature Dirac: Density Matrix of a Many-Fermion System With a Discrete Ground State; An Analytical Determination of Optical Constants Based on the Polarized Reflectance at a Dielectric - Conductor Interface: Solid State Spectroscopy -- IR Absorption Spectra of LiOH Films in the 75 to 650 cm to the -1 power Region.

AD-427 115 Div. 25
OTS price $8.10

Cornell U., School of Electrical Engineering, Ithaca, N. Y.
INVESTIGATION OF NEW CONCEPTS FOR MICROWAVE POWER GENERATION (LASER STUDIES),
Final rept.
Dec 63, 78p.
Contract AF30 602 2833, Proj. 5573, Task 557303
RADC TDR63 465,V2
Unclassified report

Descriptors: (*Lasers, Light pulses), (*Electron beams, Emissivity), Thermionic emission, Photoelectric effects, Cathodes, Tungsten, Photons, Electrons, Ions, Paricles, Diodes, Gas discharges, Microwave frequency, Power, Oxides, Single crystals, Zinc, Surfaces, Polarization, Heating, Electrical conductance.

An experimental and theoretical investigation of the emission of electrons, ions, and vertical particles from a tungsten cathode which is

Division 25 - PHYSICS

Final technical rept.,
by G. Porter and J. W. Hilpern. 30 Sep 63, 35p.
Grant AF EOAR62 113
AFCRL 63 923 Unclassified report

Descriptors: (*Polycyclic compounds, Excitation), (*Halogenated hydrocarbons, Excitation), (*Excitation, Aromatic compounds), (Aromatic compounds, Excitation), (*Phosphorescence, Aromatic compounds), Organic solvents, Alkanes, Alcohols, Solutions, Viscosity, Low temperature research, Cryogenics, Photochemistry, Flash lamps, Life expectancy, Quenching (Inhibition), Atomic energy levels, Electron transitions, Reaction kinetics, Nomographs.

Decay of the triplet states of naphthalene, 2-bromonaphthalene, anthracene, 1,5-dichloroanthracene and 9-bromophenanthrene was studied in isopentane solution over the temperature range 22 to -80 degrees C corresponding to a variation in viscosity by a factor of 10 to the 8th power. An experimental arrangement for flash investigations at low temperatures is described. When allowance is made for discontinuities in the viscosity-temperature relationships all the measurements are accounted for in terms of two regions of triplet decay. Triplet decay rates of 1- and 2-iodonaphthalene, 9,10-dibromoanthracene were studied in isopentane over the range 22 to 196 degrees C and of 2-iodonaphthalene in propylene glycol from 54 to -80 degrees C. The triplet decay rates of these compounds cannot be accounted in terms of these two regions. (Author)

AD-427 025 Div. 25
OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
ELECTROMECHANICAL ENERGY CONVERSION BY MEANS OF VARIATION OF RELUCTANCE,
by Albert Preisman and Roland W. Schlie.
25 Oct 63, 9p.
NOLTR 63 233 Unclassified report

Descriptors: (*Energy conversion, Magnet coils), Electromagnetic properties, Magnetic cores, Magnetic fields, Circuits, Coils, Electromagnets.

Formulas are developed for conversion of mechanical energy that is required to partition an iron-core magnetic circuit into electrical energy in a secondary coil circuit. Preliminary experimental test results tend essentially to substantiate the formulas as well as to point to new test setups that will be more accurate. (Author)

AD-427 055 Div. 25
OTS price $2.60

Microwave Research inst., Polytechnic Inst. of Brooklyn, N. Y.
SURFACE WAVES ON PLASMA-CLAD METAL RODS,
by T. Tamir and S. Palocz. 10 Oct 63, 24p.
Research Report PIBMRI 1197 63
Contract AF19 628 2357, Proj. 5635
AFCRL 63 523 Unclassified report

Descriptors: (*Plasma sheath, Electromagnetic waves), Bessel functions, Waveguides, Rods, Metals, Isotropism, High-frequency, Propagation, Direct current, Low frequency, Dielectrics, Surfaces, Configuration, Cylindrical bodies, Ionization.

Surface waves guided along a metal rod which is surrounded by a concentric isotropic plasma sheath are investigated for both the principal and the higher modes by employing a rigorous formulation. It is shown that all these modes exhibit a high frequency cut-off phenomenon; the two first modes propagate down to D. C. whereas all the other modes posses a finite low frequency cut-off and thus exhibit band-pass characteristics. Backward wave propagation is shown to exist when the plasma sheath is thin; dispersion curves are calculated and compared with previous data obtained by means of quasi-static approximations whose limitations and inaccuracies are also indicated. All the results are derived for the plasma-clad rod being placed either in free space or in a dielectric medium and the dispersion features for both situations are represented in terms of universal curves. (Author)

AD-427 079 Div. 25
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
ELECTRONIC ENERGY LEVELS OF Er3+(4f11) IN LaF3,
by W. F. Krupke. 8 Nov 63, 33p. Rept. no. TDR169 3250 24TN4
Contract AF04 695 169
SSD TDR63 298 Unclassified report

Descriptors: (*Erbium, Optical properties), (*Lasers, Erbium), Fluorescence, Single crystals, Impurities, Rare earth compounds, Lanthanum compounds, Fluorides, Crystal structure, Absorption, Absorption spectrum, Taylor's series, Crystal lattice defects, Colors, Atomic energy levels, Emissivity.

The analysis of the electronic states (optical spectrum) of trivalent erbium in single crystals of LaF3 was extended, based on new absorption measurements of 5000 recinrocal cm in the infrared and to 50,000 reciprocal cm in the ultraviolet and on fluorescence measurements from 3000 to 25,000 Angstroms. The crystalfield Stark components and energy centers of gravity of some 21 J-levels are now established. The parameters giving the best over-all agreement between the predicted free-ion spectrum and 21 of the observed energy centers of gravity are F2 = 435.74, F4 = 67.208, F6 = 7.388, and zeta = -2350.82 reciprocal cm. An intense ultraviolet absorption between 3500 and 1850 Angstroms, observed in even pure crystals of LaF3, is discussed interms of impurities and lattice defects. Coherent emission at 1.6 microns was observed at 77K; experiments to observe green coherent emission are also briefly discussed. (Author)

AD-427 081 Div. 25, 17
OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
THEORETICAL EQUATION OF STATE FOR FACE CENTERED CUBIC METALS,
by D. J. Pastine. 7 Aug 63, 27p.
NOL TR63 108 Unclassified report

Descriptors: (*Metals, Equations of state), (*Solids, Pressure), (*Equations of state, Metals), Equations of state, Metals). Equations, Functions, Theory, Volume, Energy, Thermodynamics, Tables, Aluminum, Copper, Magnesium, Silver, Zinc, Metallic crystals, Crystal lattices, Temperature.

A Morse function is used as the form of the volume dependent energy term in the expression for the Helmholtz free energy of a Debye solid. The consequent form of the Mie-Gruneisen equation of state is then obtained using an adjusted form of the Slater relation for the Gruneisen parameter. Theoretical Hugoniots are then calculated for Al, Cu, and Ag and found to agree well with experimental Hugoniots over a broad pressure range. (Author)

An approximate procedure is described for the theoretical calculation of the spectral absorption coefficient produced by bound-free andfree-free transitions in plasmas containing polyelectronic atoms and ions. This method of calculation is based on the assumption that only two ionized species make important contributions to the opacity and that these two ionic constituents are present in equal concentrations. The approximate formulae are shown to yield results that are in good accord with estimates based on detailed numerical computations. (Author)

AD-427 264 Div. 25
OTS price $1.60

Queens Coll., Flushing, N. Y.
THE PRINCIPLE OF EQUIVALENCE.
Dec 63, 12p. Technical rept. no. 1
Grant Nonr G00045 63
Unclassified report

Descriptors: (*Gravity, Motion), Relativity theory, Quantum mechanics.

Einstein's conclusion that the rotating object would fall more slowly as it applies to the Nordstrom theory of gravity is demonstrated. Additionally, these phenomena are investigated within the compass of a simple special-relativistic generalization of Newtonian theory and the general theory of Einstein. The former fails the test; the latter does not. (Author)

AD-427 326 Div. 25
OTS price $2.60

Chicago U., Ill.
THE NATURE AND INTERACTIONS OF HIGH ENERGY FUNDAMENTAL PARTICLES.
Final scientific rept. for period ending 30 June 63,
by R. W. Thompson. 30 June 63, 18p.
Grant DA ARO D31 124G342
AROD 2427 1 Unclassified report

Descriptors: (*Particles, Energy), Cosmic rays, Detectors, Particle accelerators, Nuclear particles, Nuclear physics, Instrumentation, Targets, Cloud chambers, Photons, Ionization, Calorimeters, Magnets, Magnetic moments, Flash lamps.

The object of this project is the design and construction of a very large detector array for cosmic ray investigations on the production, nature, and interaction of fundamental particles in an energy range several orders of magnitude above that covered by present day accelerators. (Author)

AD-427 338 Div. 25, 8
OTS price $1.25

Lear Siegler Inc., Santa Monica, Calif.
ACTIVE THIN FILM PROGRAM.
Final development rept., 22 June 62-22 Aug 63,
by Milo Macha. 22 Aug 63, 38p.
Contract NObsr87634; Proj. SR008 03 03;
Task 9631 Unclassified report

Descriptors: (*Vapor plating, Semiconducting films), (*Germanium, Vapor plating), (*Silicon, Vapor plating), (*Semiconducting films, Vapor plating), Single crystals, Crystals, Surfaces, Simulation, Diodes (Semiconductors), Circuits, Microminiaturization (Electronics), Electrical properties, Impurities, Heat treatment, Oxidation, Diffusion, Calcium compounds, Fluorides, Sapphires, Gallium alloys, Arsenic alloys.

The purpose of this work was to develop techniques for vacuum evaporation single crystal semiconductor films of germanium and/or silicon on insulating substrates. Basic feasibility studies of the films for use as active circuit elements in microelectronic assemblies, techniques for controlled doping, and fabrication of prototype elements and assemblies to prove feasibility of the processes and compatibility with vacuum deposited passive elements were included. (Author)

AD-427 339 Div. 25, 32
OTS price $2.60

Midwest Research Inst., Kansas City, Mo.
THE STRUCTURE AND STRENGTH OF EPITAXIAL FILMS.
Bimonthly progress rept. no. 1, 17 Oct-17 Dec 63,
by Melvin Lavik, Arthur Cunningham and Paul J. Bryant. 15 Jan 64, 18p.
Contract NOw64 0061d; MRI Proj. 2742P
Unclassified report

Descriptors: (*Epitaxial growth, Films), (*Films, Single crystals), *(*Reviews, Films), (*Bibliographies, Films), Crystal growth, Single crystals, Scientific research, Crystal lattice defects, Impurities, Mechanical properties.

Literature has been reviewed and categorized with a coding system. A summary of the literature is included along with a brief outline of future work to be accomplished during the second report period. The coded bibliography containing approximately one hundred references is included. (Author)

AD-427 340 Div. 25
OTS price $2.00

Lincoln Lab., Mass. Inst of Tech., Lexington.
SOLID STATE RESEARCH.
26 Dec 63, 57p.
Contract AF19 628 500
ESD TDR63 584 Unclassified report

Descriptors: (*Solid state physics, Scientific research), (*Lasers, Scientific research), (*Materials, Scientific research), (*Solids, Spectroscopy), (*Magnetism, Resonance), Crystal growth, Infrared radiation, Radar, Refractive index, High-pressure research, Chemical analysis.

AD-427 360 Div. 25, 30, 17
OTS price $2.60

David Taylor Model Basin, Washington, D. C.
AN EVALUATION OF THE HOLE-RELAXATION METHOD OF DETERMINING SURFACE RESIDUAL STRESSES,
by Peter M. Palermo. Aug 63, 25p.
Proj. S F013 03 02
DTMB 1742 Unclassified report

Descriptors: (*Stresses, Measurement), (*Surfaces, Stresses), (*Fatigue (Mechanics), Stresses), Relaxation time, Strain gages, "etal plates, Loading, Tensile properties, Def .a-tion, Steel.

The hole-relaxation technique of determining surface stresses was evaluated in load-induced linear stress fields as high as 90 percent of the yield strength of the material. Results indicate that an average accuracy of 5% is possible if strain gages 0.050 in. long are used at a dis-

surface-heated by a laser beam is described. Principal emphasis is given the phenomenon of electron emission because of the interest in its application to the formation of a very dense electron beam. Two different experimental approaches are taken in obtaining electron emission. The first approach is to collect electrons which are ''boiled off'' the surface the laser beam strikes, while the second approach is to use a very thin tungsten ribbon to collect electrons from the surface opposite the one the laser beam strikes. Preliminary theoretical work describing these phenomena is discussed. (Author)

AD-427 119 Div. 25
OTS price $4.60

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
QUANTITATIVE SPECTROSCOPIC STUDIES ON WATER VAPOR AND LIQUID WATER.
Oct 63, 43p. Technical rept. no. TR43
Contract Nonr22045; Proj. NR015 401
Unclassified repor

Descriptors: (*Infrared radiation, Absorption), (*Infrared spectroscopy, Water vapor), (*Temperature, Measurement), Absorption spectrum, Emissivity.

Contents: Measurements of Infrared Absorption by Water Vapor at Temperatures up to 1000 K, by R. Goldstein; Transmission of Infrared Radiation Through Liquid Water and Through Water Vapor Near Saturation, by R. Goldstein and S. S. Penner; The Near Infrared Absorption of Liquid Water at Temperatures Between 27 and 209 C, by R. Goldstein; Approximate Spectral Emissivity Calculations for Water Vapor at Elevated Temperatures, by R. Goldstein and L. D. Gray.

AD-427 136 Div. 25
OTS price $3.60

Rhode Island U., Kingston.
THE THEORY OF SURFACE WAVE DIFFRACTION, BY SYMMETRIC CRUSTAL DISCONTINUITIES,
by Julius Kane and John Spence. Nov 63, 1v.
Rept. no. SR2
Contract AF19 628 319, Proj. 8652; ARPA 180 62, Task 865203
AFCRL 63 719 Unclassified report

Descriptors: (*Seismic waves, Diffraction), (*Wave transmission, Analysis), Elastic scattering, Boundry valve problems, Propagation, Potential theory, Shear stresses, Calculus of variations, Reflection, Harmonic analysis, Lithosphere, Earth.

By use of symmetry considerations and variational techniques, reflection, transmission, and conversion coefficients are obtained for elastic wave diffraction at symmetric wedge-shaped obstacles for both Rayleigh and Love wave excitation. (Author)

AD-427 157 Div. 25, 32, 4
OTS price $7.60

Aerospace Information Div., Washington, D. C.
LUMINESCENCE OF COMPLEX MOLECULES. ANNOTATED BIBLIOGRAPHY BASED ON SOVIET OPEN LITERATURE.
Rept. no. 1, July-Dec 62.
30 Dec 63, 74p.
AID B63 125 Unclassified report

Descriptors: (*Complex compounds, Luminescence), (*Luminescence, Bibliographies), (*Bibliographies, Luminescence), (*Fluorescence, Bibliographies), Excitation, Life expectancy, Quantum mechanics, Dyes, Lasers, Molecular spectroscopy, Abstracts.

This bibliography is based on Soviet open-source materials available at the Aerospace Information Division and the Library of Congress and covers the period from July through December 1962. Because of its broad implications, pertinent information appearing between January and June 1962 was also included as well as references in some entries to earlier work on the same subject. The subjects of electronic and vibrational spectra of complex organic molecules, lifetime of excited states, quantum yield, quenching, polarization, and kinetics of luminescence of complex organic molecules are covered. Certain physical properties of matter relevant to luminescence and with theoretical aspects of molecular spectroscopy, internal energy-conversion processes, and intra- or intermolecular energy transfer in luminescent complex organic molecules are also presented. Applications are included of luminescence, mainly to generation of coherent light (lasers). Annotations have been provided in all cases where abstracts are not available. (Author)

AD-427 205 Div. 25
OTS price $1.10

Ohio State U. Research Foundation, Columbus.
ON THE QUESTION OF ISOTOPIC PHASE SEPARATION IN SOLID H2 - D2 MIXTURES,
by J. R. Gaines, E. M. de Castro and J. G. Daunt.
Dec 63, 5p. TR10
Contract N6onr495 20, Proj. NR018 412
Unclassified report

Descriptors: (*Hydrogen, Nuclear magnetic resonance), (*Deuterium, Nuclear magnetic resonance), (*Phase studies, Isotopes), (*Nuclear magnetic resonance, Hydrogen), Mixtures, Protons, Resonance, Separation, Mathematical analysis.

The purpose of the research was to investigate possible isotopic phase separation in solid H2 - D2 mixtures by observing line widths and line shapes of nuclear resonance. A calculation of the rigid lattice second moment for protons in a homogeneous solid H2 - D2 mixture was made. Observations of the N.M.R. line widths and line shapes of solid mixtures of n-H2 and n-D2 at 4.2 K showed the line shapes to be Gaussian and yielded widths which are illustrated. The calculated shape of the derivative of a resonance line obtained from a phase separation of a sample of original concentration X sub H2 = 0.20 into regions with concentration X sub H2 = 0.95 and X sub H2 = 0.05 is presented. The composite nature of the line is evident. (Author)

AD-427 209 Div. 25
OTS price $5.60

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
APPROXIMATE THEORETICAL CALCULATIONS OF CONTINUUM OPACITIES: I. RADIANT ENERGY EMISSION FROM ISOTHERMAL AND NON-ISOTHERMAL GASES: II,
by M. Thomas and S. S. Penner. Nov 63, 50p.
Technical rept. no. 44
Contract Nonr22045, Proj. NR015 401
Unclassified report

Descriptors: (*Continuum mechanics, Absorption spectrum), Plasma medium, Gas ionization, Plasma physics, Theory, Electrons, Atoms, Ions, Numerical analysis, Integrals, Temperature, Errors, Analysis, Energy, Density.

AD-427 692 Div. 25, 15
OTS price $2.60

Duke U., Durham, N. C.
SOME EXACT RADIAL INTEGRALS FOR DIRAC-COULOMB FUNCTIONS,
by J. T. Reynolds, D. S. Onley and L. C. Biedenharn. 1963, 22p.
Unclassified report

Descriptors: (*Inelastic scattering, Functions), Integrals, Energy, Electrons, Differential cross-section, Quantum mechanics.

The zero energy loss Dirac-Coulomb integrals are evaluated using the technique of contour integration. The expressions obtained have a closed analytic form, showing that these integrals are formally similar to the corresponding classical and nonrelativistic quantum-mechanical zero energy loss integrals which also have exact elementary solutions. Application of the zero energy loss Dirac-Coulomb integrals occurs in inelastic electron scattering and similar problems. As a preliminary, investigation of the finite energy loss Dirac-Coulomb integrals requires a study of the zero energy loss integrals. (Author)

AD-427 693 Div. 25
OTS price $19.75

Raytheon Co., Wayland, Mass.
INVESTIGATION OF MICROWAVE COUPLING AND ENERGY PARTITION AND TRANSPORT WITHIN A PLASMA. VOLUME I. CHAPTER I. FUNDAMENTAL CONCEPTS, TECHNIQUES, AND APPARATUS FOR THE MEASUREMENT OF GAS PROPAGATION CHARACTERISTICS AT HIGH MICROWAVE POWERS.
Final rept.
by E. Rolfe, T. C. Athanis, C. Ferrar, R. Golub and S. P. Heims. June 63, 1v. Rept. no. SR2
Contract AF19 604 7339; Projs. 4619, 5561; Tasks 46191, 46304
AFCRL 63 199, vol. 1 Unclassified report

Descriptors: (*Plasma physics, Electromagnetic waves), Microwave equipment, Transport properties, Plasma oscillations, Microwave frequency, Absorption, Gas ionization, Electric discharges, Electron density, Bremsstralung Plasma sheath, Reentry vehicles, Wave transmission, Waveguides, Probes (Electromagnetic), Instrumentation, Gas-generattion systems, Calibration, Waveguide slots.

This report describes the theoretical and experimental research program concerned with plasmas, particularly with the mechanisms of high-power microwave energy absorption and thermal energy transfer in a gas, the consequent heating of the un-ionized components of the gas, and the deionization and energy loss mechanisms involved. A detailed theoretical analysis of physical mechanisms governing the absorption of microwave radiation in gaseous plasmas are discussed, also two different methods of treatment used in the analysis of plasma behavior. Wave propagation through a plasma-filled waveguide section and results of calculations performed are summarized in this report. (Author)

AD-427 694 Div. 25, 27
OTS price $3.60

Rocket Power Inc., Pasadena, Calif.
STUDY OF ROCKET ENGINE EXHAUST PRODUCTS.
Annual summary rept. no. 2, 1 July 62-31 July 63,
by M. A. Greenbaum, R. Yates, M. Arshadi, M. L. Arin and M. Wong. 31 July 63, 31p.
Contract AF04 611 7414
Unclassified report

Descriptors: (*Rocket motors, Exhaust gases), (*Thermodynamics, Beryllium compounds), Sublimation, Enthalpy, Entropy, Heat of formation, Oxides, Chlorides, Temperature, Nitrides, Decomposition, Vacuum furnaces, Pressure, Tables.

Some thermodynamic properties of BeF2(g), BeCl2(s), BeCl(g); BeO(s) and Be3N2(s) were determined. Table summaries of the work completed during the past year are given. Third law calculations as well as the thermodynamic values reported at 298 K have employed the latest data reported in the JANAF Tables. (Author)

AD-427 695 Div. 25
OTS price $1.10

Rochester U., N. Y.
THEORETICAL STUDIES OF THE ELECTROMAGNETIC FIELD IN THE FOCAL REGION OF COHERENT LIGHT BEAMS.
Progress rept. no. 2, 1 Apr-30 Sep 63,
by Emil Wolf. 30 Sep 63, 4p.
Contract DA AROD31 124G325, Proj. 3663P
Unclassified report

Descriptors: (*Beams (Electromagnetic), Lasers), (*Electromagnetic fields, Theory), Light transmission, Stochastic processes, Optics.

AD-427 725 Div. 25
OTS price $.75

New Mexico State U. of Agriculture, Engineering and Science, University Park.
VARIATION OF REFRACTIVE INDEX DURING LASER OPERATION.
Semi-annual technical rept. no. 1,
by J. R. Izatt, H. A. Daw and R. C. Mitchell.
Jan 64, 22p.
Contract Nonr3531 04
Unclassified report

Descriptors: (*Lasers, Refractive index), Ruby, Atomic energy levels, Statistical distribution, Emissivity, Absorption, Interferometers, Detectors, Optical filters, Prisms (Optics), Flash lamps, Design, Diffraction, Discharge tubes, Single crystals.

The refractive index of a laser in the region of anomalous dispersion surrounding the active laser frequency should vary as the relative population of states changes. The behavior of the multimode cavity depends on the index of refraction of the laser material, and hence this effect influences the temporal evolution of the mode structure in the cavity. Variation in refractive index as a function of the distribution of population among pertinent energy states can be studied experimentally. The latter is optically pumped to achieve a sequence non-Boltzmann population distributions, and an interferometric technique is employed to determine refractive index as a function of frequency for each distribution. Several items of equipment are described which were designed and constructed to partially fill the optical pumping and temperature control requirements of the experiment. A unique cast-plastic optical-pump cavity is described which has displayed high optical efficiency in addition to being durable and economical. (Author)

AD-427 730 Div. 25
OTS price $9.10

Illinois U., Engineering Experiment Station, Urbana.
SCATTERING OF RUBY LASER LIGHT BY GASES.

tance of 5/16 in. from the center of a 7/16-in.-diameter hole. Test results also indicate that a depth of hole equal to one-half the hole diameter is sufficient to obtain all of the relaxation strains on the surface at which the hole is drilled. Tests were also conducted using 5/16-in.-diameter holes, and although good results were obtained, the overall degree of accuracy was not as great as with the 7/16-in.-diameter holes. (Author)

AD-427 361 Div. 25, 15
OTS price $4.60

Washington U., Seattle. Coll. of Engineering.
POLE CONTRIBUTIONS TO ELECTROMAGNETIC FIELDS IN THE LIGHT OF A MODIFIED SADDLE POINT TECHNIQUE,
by Gary D. Bernard and Akira Ishimaru. Oct 63, 41p. Technical rept. 82
Contract AF19 628 2763, Proj. 5635, Task 563 502
AFCRL 63 565 Unclassified report

Descriptors: (*Electromagnetic fields, Theory), Transformations (Mathematics), Numerical analysis, Integral transforms, Mathematical models, Wave transmission, Surfaces, Propagation, Plasma medium.

Saddle point techniques have been used for many years to evaluate integral transforms that arise in problemsof electromagnetic theory. When a pole of the integrand is close to the saddle point, as in the case of the Sommerfeld pole, one of several available modified saddle point techniques must be used. When a pole is present in the integrand, such as that corresponding to a leaky or slow wave, the approximation in common use is to take the first saddle point term obtained by ignoring the pole, plus a residue term if the pole in question has been captured in the deformation of the original path of integration. This approximation gives rise to a diagram for the pole contribution to the total solution which is present only in the wedge shaped region defined by the definition angle and the horizontal. Though this diagram has been shown to be useful for some cases, it has not as yet been clarified just when this approximation is valid. Thus it is felt that it is interesting and useful to provide such clarification. (Author)

AD-427 371 Div. 25
OTS price $1.10

Carborundum Co., Niagara Falls, N. Y.
A STUDY OF FUNDAMENTAL MECHANICAL PROPERTIES OF CERAMIC SINGLE CRYSTALS.
Bi-monthly progress rept. no. 5, 15 Sep-14 Nov 63
by R. S. Liebling. 27 Nov 63, 4p.
Contract N600 19 59749
Unclassified report

Descriptors: (*Silicon compounds, Carbides), (*Loading (Mechanics), Single crystals), Fracture (Mechanics), Boron, Temperature, Thickness, Stresses, Surfaces, Mechanical properties, Ceramic materials.

Load capacity of bar shaped silicon carbide single crystals varies inversely with the length width ratio and boron concentration. As thickness increases, load capacity increases. The effects of temperature, thickness, length, width, boron concentration, and surface treatment are being thoroughly analyzed using data processing equipment. Furture research will concentrate on chemical polishing with chlorine gas, oxygen, KNO3 + KOH, and borax. Electrolysis in water and molten NaOH will also be studied as possible polishing techniques. (Author)

AD-427 591 Div. 25
OTS price $1.10

Microwave Lab., Duke U., Durham, N. C.
DUKE MICROWAVE LABORATORY TO AIR FORCE OFFICE OF SCIENTIFIC RESEARCH, U.S. AIR FORCE.
Final rept. 1 Mar 62-1 Oct 63,
by Walter Gordy. 30 Sep 63, 10p.
Grant AF AFOSR62 327
AFOSR J1591 Unclassified report

Descriptors: (*Microwave spectroscopy, Research program administration), (*Cyclotron resonance phenomena, Flames), Millimeter waves, Spectrum analyzers, Microwave equipment.

AD-427 592 Div. 25
OTS price $1.60

Microwave Lab., Stanford U., Calif.
INTERACTION OF MICROWAVES WITH MATTER.
Final technical rept., 1 May 62-30 Apr 63.
June 63, 14p. Rept. no. 1044
Grant AF AFOSR343, Contract AF49 638 415
AFOSR J1590 Unclassified report

Descriptors: (*Microwaves, Research program administration), (*Plasma physics, Cerenkov radiation), Materials, Fluorescence, Plasma sheath, Electromagnetic waves, Electrostatics, Oscillations, Gallium compounds, Oxides, Chromium, Impurities, Ferrites, Excitation, Solid state physics, Theory, Metals.

AD-427 594 Div. 25
OTS price $1.10

California U., Berkeley.
RESEARCH ACCOMPLISHMENTS.
Final technical rept. 1 May 62-30 Apr 63,
by Arthur F. Kip. 30 Apr 63, 3p.
Grants AF AFOSR62 127, AF AFOSR290 63
AFOSR J1604 Unclassified report

Descriptors: (*Cyclotron resonance phenomena, Magnetic fields), (*Metals, Single crystals), Tin, Copper, Potassium, Sodium, Aluminum, Crystal growth, Microwave equipment Research program administration.

AD-427 691 Div. 25, 15
OTS price $2.60

Duke U., Durham, N. C.
REMARKS ON THE RELATIVISTIC KEPLER PROBLEM II. AN APPROXIMATE DIRAC-COULOMB HAMILTONIAN POSSESSING TWO VECTOR INVARIANTS,
by L. C. Biedenharn and N. V. V. J. Swamy.
12 Aug 63, 23p.
Unclassified report

Descriptors: (*Charged particles, Nuclear spins), (*Quantum statistics, Relativity theory), Operators (Mathematics), Bremsstrahlung, Functions, Differential equations.

The Dirac-Coulomb Hamiltonian is shown to contain a ''fine structure interaction'' which, when removed, defines a new Hamiltonian differing from the Dirac-Coulomb Hamiltonian in order (αz) to the second power/$|\kappa|$. The solutions of this new Hamiltonian, as well as its complete set of invariant operators, are explicitly given. This 'symmetric Hamiltonian' possesses a larger symmetry group than the R4 group structure of the nonrelativistic Coulomb Hamiltonian. The simplicity of the complete orthonormal set of solutions of the symmetric Hamiltonian lends itself to several useful applications which are briefly indicated. The relation is discussed between solutions of this new Hamiltonian and the Sommerfeld-Maue-Meixner-Furry (S-M-M-F) wave functions. (Author)

AD-427 797 Div. 25, 15
OTS price $1.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
STRUCTURE OF THE BOUNDARY LAYER IN A MAXWELLIAN PLASMA,
by M. H. Millman and J. Hurley. Nov 63, 9p.
Research rept. no. EM193
Contract AF19 604 3495, Proj. 5631, Task 563104
AFCRL 63 376 Unclassified report

Descriptors: (*Plasma medium, Boundary layer), (*Magnetohydrodynamics, Electromagnetism), One-dimensional flow, Magnetic fields, Motion, Equation, Ions, Electrons, Inequalities, Functions, Distribution theory, Particles, Electron density.

The problem considered is that of the transition region separating a uniform Maxwellian Plasma from its confining magnetic field. The geometry chosen is one-dimensional. The magnetic field profile within the boundary layer is determined by the current distribution, i.e., by the path of the ions and electrons. The paths of these particles on the other hand are determined by the fields in which they move. The equation of motion of the ions is treated exactly and the electrons in the guiding center approximation. A self consistent solution of Maxwell's equations is obtained. These results are compared with thoses obtained for a mono-energetic distribution and found to agree to within 10%. (Author)

AD-427 803 Div. 25
OTS price $2.60

Microwave Lab., Stanford U., Calif.
MILLIMETER GENERATION AND NONLINEAR PROPAGATION IN FERROMAGNETICS.
Rept. no. 4, 1 July-30 Sep 63.
Nov 63, 19p. Rept. no. 1107
Contract DA36 039AMC00041E
Unclassified report

Descriptors: (*Millimeter waves, Propagation), (*Ferromagnetic materials, Ferrites), Solid state physics, Magnetic fields, Dielectrics, Generators, Electromagnetic pulses, Computers, Transients, Nonlinear systems.

The computer investigation of transient spin wave build-up has been extended to further parameter ranges, and generalized to include spin waves from the complete spin wave manifold. The result defines the parameters required in the high power type II device to avoid spin wave degradation, and predicts a favorable result for high power generation. Work on production of pulsed magnetic fields to meet the new requirements for high power type II generators has encountered several new, and initially disturbing, effects, mostly concerned with scaling of the pulsing lines to lower impedance levels. All but one of these effects has been overcome, and the last is being studied. (Author)

AD-427 812 Div. 25
OTS price $2.60

RCA Labs. Div., Radio Corp. of America, Princeton, N. J.
RESEARCH ON THE VOLUME RECOMBINATION OF CESIUM IONS.
Final rept. 1 Oct 60-30 June 63,
by J. M. Hammer, J. J. Thomas, and B. B. Aubrey.
Nov 63, 25p.
Contract DA44 177TC694T, Task 1D010501A01408
ATRECOM TR63 73 Unclassified report

Descriptors: (*Cesium, Ions), (*Ions, Recombination reactions), Volume, Theory, Atomic structure, Molecular structure, Experimental data, Capacitance, Sources, Porous metals, Ion accelerators, Plasma oscillation.

The feasibility of the ion beam method of measuring the recombination cross section of cesium ions is demonstrated. Preliminary results are given. The atomic recombination cross section of C(s+) is less than or equal to 5 x 10 to the -19th power sq cm, while the molecular (dissociative) recombination cross section of Cs(2+) is less than or equal to 3 x 10 to the -14th power sq cm. The method is described briefly and the results are presented in detail and discussed. (Author)

AD-427 822 Div. 25, 8
OTS price $3.60

Sperry Microwave Electronics Co., Clearwater, Fla.
DEVELOPMENT OF ADVANCED MICROWAVE COMPONENTS AND TECHNIQUES - PLANAR HEXAGONAL FERRITES AND DEVICES.
Progress rept., 28 June-28 Sep 63.
Dec 63, 36p.
Contract AF30 602 2757, Proj. 4506, Task 450602
RADC TDR63 508 Unclassified report

Descriptors: (*Ferrites, Magnetic properties), (*Ceramic materials, Magnetic properties), (*Waveguides, Materials), Microwave equipment, Zinc compounds, Yttrium compounds, Copper compounds, Nickel compounds, Cobalt compounds, Iron compounds, Oxides, Garnet, Aluminum compounds, Alcohols, Water, Anisotropy, Magnetic properties, Resonance, Magnetic fields, Perturbation theory, Mathematical analysis.

The preparation process evolved is capable of producing good ceramic materials with high density and good alignment. These materials do not as yet exhibit as narrow a linewidth as expected. Trivalent Al substituted for trivalent Fe apparently forms a second phase material rather than entering the Y structure. A deficiency of Fe helps to lower the dielectric loss tangent of Zn2Y, perhaps by offsetting the Zn loss on firing, but this step is not universally effective among the other Y compounds. By using the alignment techniques developed for these planar materials, cubic ferrites can be successfully oriented even in cases of small anisotropy. At least partially successful alignment was achieved on yttrium iron garnet with anisotropy fields of 40 oersteds. (Author)

AD-427 834 Div. 25, 4
OTS price $3.60

Case Inst. of Tech., Cleveland, Ohio.
PRESSURE DERIVATIVES OF THE SINGLE CRYSTAL ELASTIC CONSTANTS OF POTASSIUM,
by Paulen A. Smith. Dec 63, 34p. Rept. no. 7
Contract Nonr114105, Proj. NR017 309
Unclassified report

Doctoral thesis.

Descriptors: (*Potassium, Single crystals), (*Pressure, Measurement), Ultrasonic radiation, Alkali metals, Shear stresses, Anisotropy, Electrostatics, High pressure research, Atomic properties, Etched crystals, Symmetry (Crystallography), Crystal growth.

The elastic stiffness constants of single crystal potassium and their pressure derivatives were measured at room temperature by the ultrasonic

Final rept.,
by T. V. George and L. Goldstein. Oct 63, 93p.
SR5
Contract AF19 604 7473; Proj. 5634; Task 46191
AFCRL 63 549 Unclassified report

Descriptors: (*Lasers, Ruby), (*Scattering, Gases), Light transmission, Electromagnetic waves, Refraction, Reflection, Air, Hydrogen, Nitrogen compounds, Oxides, Photomultipliers, Calibration, Curve fitting, Xenon, Polarization, Lenses, Optical equipment, Oscillators, Flash lamps, Design, Oscillographs, Propagation.

The advent of the laser has made it possible to conduct a more complete sudy of Rayleigh scattering. Earlier measurements of Rayleigh cross section for gases were made only at right angles to the incident light beam. In the present experiment the angular distribution of the light scattered by gas molecules was measured from 45 to 135 degrees from the direction of the incident beam in argon at one atmosphere and xenon at 135 mmHg of pressure. Experimental results show partial agreement with the Rayleigh theory. The lack of agreement is perhaps due to coherence effects. In argon, the scattered intensity shows a linear pressure dependence. No dependence of scattering cross section on the beam power level was found in either monatomic or polyatomic gases. The differential scattering cross section at an angle of 60 degrees with the beam was determined for various gases and compared with that calculated from known values of refractive indices. An empirical analysis of the discrepancy between the experimental observation and Rayleigh theory is also presented. (Author)

AD-427 734 Div. 25, 14
OTS price $1.25

National Carbon Co. Inc., Cleveland, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME XIX. THERMAL STRESSES IN ANISOTROPIC HOLLOW CYLINDERS,
by Tu-Lung Weng. Dec 63, 36p.
Contract AF33 616 6915; Projs. 7350, 7381; Tasks 735002, 738102
WADD TR61 72, vol.19 Unclassified report

Descriptors: (*Graphite, Cylindrical bodies), (*Cylindrical bodies, Graphite), (*Thermal stresses, Cylindrical bodies), Anisotropy, Partial differential equations, Temperature, Distribution, Tensile properties, Compressive properties, Cooling, Stresses, Mathematical analysis.

The equations of thermal stresses and displacements in anisotropic hollow cylinders subjected to various arbitrary temperature boundary conditions have been derived. The hollow cylinder is assumed to be made of transversely isotropic material. Several numerical examples are treated and the effects of the degree of anisotropy on the magnitudes of the critical stress and maximum permissible gas temperature for various sizes of grade ATJ and grade ZTA graphite hollow cylinders are examined. The errors are calculated which could result from the assumption of isotropic material. (Author)

AD-427 739 Div. 25, 27
OTS price $8.60

Space Technology Labs. Inc., Redondo Beach, Calif.
RESEARCH ON THE ELECTROSTATIC GENERATION AND ACCELERATION OF SUBMICRON-SIZE PARTICLES.
Final rept., Aug 59-Apr 63,
by E. Cohen. May 63, 87p.
Contract AF33 616 6775; Proj. 7116; Task 7116 03
ARL 63 88 Unclassified report

Report on Energy Conversion Research.

Descriptors: (*Drops, Electrical properties), (*Particles, Electrical properties), (*Electric propulsion, Particles), Energy conversion, Ions, Liquid metals, Oils, Alcohols, Salts, Electrical propertics, Electric fields, Electron microscopy, Field emission, Particle size, Ion beams, Antimony compounds, Chlorides, Acceleration, Generators, Jets, Detectors.

Research involved in generating submicron-size positively charged liquid droplets is described. The droplets formed may be either liquid metal, or organic fluids. An analysis is developed to indicate the relationship between particle size and the parameters of field emission and surface tension. Charge/mass ratios were obtained. Charge/mass distributions are shown for both metals and organic fluids. Although ions were often found, particularly with the metal fluids, narrow peak distributions of charge/mass could be obtained with no appreciable number of ions when using the organic liquids. The effect upon the charge/mass peak of the mass flow rate and the potential of the point emitter is demonstrated. The efficiency of an ion engine as a function of charge/mass distribution about a peak was evaluated for several typical curves. (Author)

AD-427 745 Div. 25, 27
OTS price $2.25

Carnegie Inst. of Tech., Pittsburg, Pa.
UNCONVENTIONAL METHODS FOR INFLUENCING FLUID FLOW. VOL. II. THE THERMOMOLECULAR EFFECT WITH APPLICATIONS TO ENERGY CONVERSION.
Final rept.
by George Anthony McLennan. Nov 63, 85p.
Contract AF33 657 9914; Proj. 8169; Task 816904
ASD TDR63 776, Vol. 2 Unclassified report

Descriptors: (*Energy conversion, Thermodynamics), (*Fluid flow, Gases), Refrigerant compressors, Thermionic converters, Heat transfer, Irreversible processes, Work functions, Refrigeration systems, Temperature, Effectiveness.

The phenomenon of the thermomolecular pressure rise in a gas, which occurs across a capillary material by virtue of a temperature difference, has been analyzed in several energy conversion devices which are by nature thermodynamically irreversible. Large temperature differences have been considered. The effects of heat transfer through the capillary material and a potential energy work function have been included. Three different heat engine cycles were analyzed requiring different thermodynamic processes, and the maximum efficiency determined for various imposed temperature differences, treating heat transfer and the work function separately. The efficiency of a single device was compared to that of a cascade of similar devices operating over the same temperature difference. A thermomolecular gas compressor, having no moving parts, was analyzed and the efficiency and pressure rise determined as a function of a gas flow rate, treating heat transfer, work function and imposed temperatures as parameters. A thermomolecular refrigeration cycle was considered in which a mechanically imposed gas flow results in a refrigerating effect. The minimum possible refrigerated temperature and the maximum effectiveness of this device were determined for various values of the appropriate parameters. (Author)

technique may be applied to heteroatoms in a molecule, to central atoms in a crystal field, to chemical bonds in a molecular environment, and to discuss the question of dressed and undressed particles. If the system under consideration is not complete, the addition of a complementary subspace leads to a new term in the Hamiltonian corresponding to a dressing of the system involved. It is shown that eigenvalue problems associated with contracted Hamiltonians may be solved by iteration procedures. (Author)

26. PRODUCTION AND MANAGEMENT

AD-427 011 Div. 26
OTS price $1.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
INVESTIGATION OF SWIVEL JOINTS FOR USE WITH FUEL OIL BURNER LEADS.
Evaluation test rept.,
by D. G. Hansen. 8 Nov 63, 7p.
Proj. F013 06 16, Task 4195
NBTL ETR B514 Unclassified report

Descriptors: (*Fuel oil, Distribution), (*Flexible couplings, Pipes), Pipe fittings, Boilers.

Barco aircraft type swivel joint assemblies were tested to determine the suitability of these devices for providing flexibility in fuel oil burner lead piping. The sizes tested were 1/2 and 3/4 in. Test results indicate that adequate flexibility is obtained by use of the joints, however, high pressure drops and problems of construction and bulk make these joints unsuitable for the intended service. (Author)

AD-427 112 Div. 26, 8
OTS price $4.60

Westinghouse Electric Corp., East Pittsburgh, Pa.
PRODUCTION ENGINEERING MEASURE.
Quarterly rept. 29 June-30 Sep 63,
by Hauw T. Go. 30 Sep 63, 42p.
Contract DA36 039AMC11515
Unclassified report

Descriptors: (*Transistors, Production), (*Production, Manufacturing methods), Manufacturing methods, Transistors, Computer logic, Circuits, Reliability (Electronics), Switching circuits, Photoengraving, Silicon, Bonding, Electric wire, Gold, Aluminum, Performance (Engineering), Printed circuits.

The objective of this report is to improve production techniques, thereby increasing the reliability of certain components. To achieve the stated goal failure rates, a systematic plan was initiated to eliminate the overriding failure mechanism of weak bonds. Initial planning and scheduling in all areas are finished. In addition, the following technical activities have been initiated or completed: design, assembly, photochemistry, and reliability and verification. (Author)

AD-427 151 Div. 26
OTS price $1.25

Rock Island Arsenal Lab., Ill.
THE USE OF VOLATILE CORROSION INHIBITORS WITH FERROUS AND NONFERROUS METAL FINISHES,
by Robert E. Johnson. 28 May 63, 47p.
DA Proj. 1A0 24401A109
RIAL 63 1836 Unclassified report

Descriptors: (*Packing materials, Corrosion inhibition), (*Paper, Impregnation), (*Metals, Finishes & finishing), Coatings, Metal coatings, Phosphate coatings, Oxides, Chromates, Cadmium, Chromium, Zinc coatings, Mineral oils, Storage, Environmental tests.

Four volatile corrosion inhibitor (VCI) materials were evaluated up to eight years in outdoor, shed, and indoor storage to determine the degree of protection provided to packaged ferrous and nonferrous metal panels with various finishes, and to determine the necessity of providing a well sealed package to reduce the loss of VCI vapors. The work indicated that there are VCI materials available that will provide satisfactory protection to ferrous metal finishes in extended storage. The VCI materials provided no significant protection to nonferrous finishes, such as cadmium and zinc plate. (Author)

AD-427 159 Div. 26
OTS price $7.60

Republic Aviation Corp., Farmingdale, N. Y.
ELECTRO-SPARK EXTRUDING.
Interim technical engineering progress rept. no. 2, 1 Oct 63-1 Jan 64,
by B. Leftheris, G. Pfanner and J. Wagner.
Jan 64, 69p. Rept. no. 2027
Contract AF33 657 11265, Proj. 8 111
ASD TR8 111, vol. 2 Unclassified report

Descriptors: (*Material forming, Extrusion), (*Capacitors, Electric discharges), (*Explosive forming, Steel), Hydrostatic pressure, Shock waves, Pressure vessels, Design, Wave transmission, Mathematical analysis.

This report presents the results of a mathematical analysis to indicate that extrusion of a billet is theoretically possible, and that a thick walled cylindrical container can be fabricated to stand stress waves from transient detonation internal loads over high hydrostatic pressures. The propagation of a pressure pulse and its ensuing effects require a different theoretical treatment from existing treatments of flow or extrusion. (Author)

AD-427 224 Div. 26, 17, 12
OTS price $7.60

Solar, San Diego, Calif.
DEVELOPMENT OF MANUFACTURING METHODS FOR LIGHTWEIGHT METAL FOIL HEAT EXCHANGERS.
Interim technical rept. no. 6, 18 Sep-17 Dec 63,
by J. P. Boland, L. A. Schlagel and W. A. Compton. 10 Jan 64, 55p. Rept. no. ER1245 8
Contract AF33 657 8766; Proj. 7 936
Unclassified report

Descriptors: (*Heat exchangers, Aluminum alloys), (*Foils, Heat exchangers), (*Aluminum alloys, Heat exchangers), Thermal insulation, Spacecraft, Heat resistant metals and alloys, Brazing, Stainless steel, Manufacturing methods, Refractory coatings, Tests, Mechanical properties, Oxidation, Photomicrography, Electron beams, Welding.

The principal effort on this program during the period from 18 September to 17 December 1963 was concerned with the development of fabrication techniques for the construction of metal foil heat exchangers. The experimental work accom-

pulse echo method. The results were interpreted in terms of Fuchs' theory of the electrostatic contribution to the shear stiffnesses of the alkali metals. The experimental observation that the elastic anisotropy, C/C', does not depend on pressure indicates that, as Daniels found for sodium, it is not necessary to include an ion core interaction or a Fermi contribution to the shear stiffnesses in order to account for the results. The latter conclusion is consistent with a spherical Fermi surface. The bulk modulus and its pressure dependence fit very well the simplest model of the binding energy. (Author)

AD-427 839 Div. 25
OTS price $26.00

Northwestern U., Evanston, Ill.
TABLES OF THERMODYNAMIC PROPERTIES OF ARGON, NITROGEN, AND OXYGEN PLASMAS,
by K. S. Drellishak, D. P. Aeschliman and Ali Bulent Cambel. Jan 64, 565p.
Contract AF40 600 972, Proj. 8951, Task 895104
AEDC TDR64 12 Unclassified report

Descriptors: (*Plasma medium, Thermodynamics), (*Oxygen, Plasma medium), (*Nitrogen, Plasma medium), (*Argon, Plasma medium), (*Table, Plasma medium), Pressure, Temperature, Theory, High temperature research, Gases, Functions, Programming (Computers), Gas ionization.

Thermodynamic properties of oxygen and nitrogen plasmas at various pressures and temperatures are presented. The thermodynamic properties are also presented of argon plasma at a pressure of 0.01 atmospheres, which constitutes an extension of the property values presented in 'Partition Functions and Thermodynamic Properties of Argon Plasmas', AEDC-TDR-63-146, August, 1963. The underlying theory is described in 'Partition Functions and Thermodynamic Properties of High Temperature Gases', AEDC-TDR-64-22. (Author)

AD-427 845 Div. 25
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
CONTINUOUS ABSORPTION COEFFICIENTS OF CHLORINE,
by Roger L. Wilkins. 10 Jan 64, 14p. Rept. no. TDR269 4230 10 1
Contract AF04 695 269
SSD TDR63 251 Unclassified report

Descriptors: (*Chlorine, Absorption spectrum), (*Absorption spectrum, Chlorine), High temperature research, Excitation, Electron transitions, Atomic energy levels, Mathematical analysis, Digital computers, Spectra (Visible and ultraviolet), Diatomic molecules, Gases.

Continuous absorption coefficients of chlorine have been calculated at wavelengths between 4000 and 2300 angstroms for temperatures from 291 to 2400 K. The necessary partial absorption coefficients were calculated on a high-speed electronic digital computer. The resulting total absorption coefficients for chlorine agree well enough with the available experimental data to verify existing theory. (Author)

AD-427 852 Div. 25
OTS price $2.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
MOLECULAR ORBITALS AND ELECTRON-TRANSFER SPECTRA IN RUTILE. GROWTH OF CRYSTALS BY FLAME FUSION,
by Carl W. Nelson and Arthur Linz. Dec 63, 26p. Rept. no. TR184; 185
Contracts AF33 616 8353, AF19 628 395, Proj. 7371, Task 737101
Unclassified report

Report on Applied Research in Electrical, Electronic and Magnetic Materials.

Descriptors: (*Crystal growth, Single crystals), (*Titanium compounds, Oxides), (*Absorption, Measurement), Electron transitions, Spectrophotometers, Ultraviolet radiation, Polarization, Crystal structure, Symmetry (Crystallography), Yttrium compounds, Aluminum compounds.

AD-427 870 Div. 25
OTS price $5.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
INVESTIGATION OF NON-EQUILIBRIUM IONIZATION FOR MHD ENERGY CONVERSION.
Quarterly rept. no. 7, 15 Sep-15 Dec 63,
by B. Hoffman. 15 Dec 63, 1v.
Contract AF33 657 8298, Proj. 8173, Task 817306
Unclassified report

Descriptors: (*Energy, Magnetohydrodynamics), (*Magnetohydrodynamics, Energy), (*Ionization, Magnetohydrodynamics), High temperature research, Generators, Potassium, Electric fields, Vaporization, Argon, Dynamics, Alkali metals, Mathematical models, Equations, Electrical conductance.

A theoretical and applied research program directed toward prolonging the lifetime of magnetohydrodynamic (MHD) energy converters to the range 1000 K to 2000 K is reported. The process of interest is the use of the self-induced electric field in MHD generator for electrical breakdown of appropriate working fluids of interest. Work is directed toward the use of potassium for Rankine (Vapor) cycles. The potassium vapor blowdown system reached operational capability. Argon blowdown shakedown runs are underway to determine the dynamic behavior of the system. Design of the Rankine cycle alkali metal vapor facility was completed. All major hardware items were placed on order for January-February 1964 delivery. A mathematically consistent model for the transport of electrons in a wet vapor was formulated. A complete set of equations was obtained to describe the electrical conductivity of a wet vapor as a function of the fluid pressure, temperature, and flow velocity, the external electromagnetic fields, the percent moisture, and the droplet radius. (Author)

AD-427 893 Div. 25
OTS price $2.60

Uppsala U. (Sweden).
STUDIES IN PERTURBATION THEORY VI. CONTRACTION OF SECULAR EQUATIONS VII. LOCALIZED PERTURBATION,
by Per-Olov Lowdin. 1 Sep 61, 18p. Rept. no. TN64; TN65
Contract AF61 052 351
ARL 63 243 Unclassified report

Descriptors: (*Particles, Perturbation theory), Quantum mechanics, Equations, Crystals, Impurities, Functions, Atoms, Molecules.

The partitioning technique for solving secular equation is discussed. It is shown that the orginal secular equation may be transformed to a contracted secular equation referring to the specific subspace under consideration. The

AD-427 697 Div. 26, 14
OTS price $2.60

Lookheed Aircraft Corp., Marietta, Ga.
ESTABLISH THE GENERAL USE OF CERAMIC TOOLS IN PRODUCTION.
Interim rept.,
by C. M. Head. 1 Apr 63, 27p. GMRI 660 02
Contract AF33 600 36888
Unclassified report

Descriptors: (*Maintenance equipment, Production), (*Ceramic material, Maintenance equipment), Dies, Test methods, High temperature research, Cold working, Glass textiles, Molding, Embedding substances, Valves, Tables.

Ceramic toolong is now used to satisfy the requirements of cold forming and high temperature applications. Work during this period was concerned with molding dies, embedded element hot sizing tooling, layup blocks, and production improvement methods. Three ceramic mold dies and three layup blocks are now used in production. The hot sizing die now being modified after satisfactorily completing a large production order. The release of fiberglass parts from the tool has been facilitated through the development of a pressure actuated air jet valve and an improved release agent. Ceramic molding dies, layup blocks, and hot sizing dies are capable of producing acceptable parts. Further development is needed to standardize tool fabrication and use techniques. (Author)

AD-427 698 Div. 26
OTS price $1.60

Lockheed Aircraft Corp., Marietta, Ga.
ESTABLISH THE GENERAL USE OF CERAMIC TOOLS IN PRODUCTION.
Interim rept.,
by C. M. Head. 12 Aug 63, 14p. Rept. no. GMRI660 04
Contract AF33 600 36888
Unclassified report

Descriptors: (*Molding, Production), Ceramic materials, Molding materials, Glass textiles, Plastic coatings, Halocarbon plastics, Tables, Epoxy plastics.

Ceramic tooling is now used to satisfy the requirements of cold forming and high temperature applications. Work was concerned with molding dies, embedded element hot sizing tooling, hydroblocks, and tooling improvement methods. One new molding die is now used in production. Heat differential problems of the hot sizing die have largely been eliminated. Ceramic molding dies, hydroblocks, and hot sizing dies are capable of producing acceptable parts. Additional applications of ceramic tooling should be considered where heat distortion of conventional tools is a problem, and for reduction of tooling costs. (Author)

AD-427 846 Div. 26, 25, 8
OTS price $3.60

Sperry Microwave Electronics Co., Clearwater, Fa.
PRODUCTION ENGINEERING MEASURE YIG SPHERES AND LIMITERS.
Quarterly progress rept. no. 1, 29 May-29 Aug 63,
by J. Brown and D. Tribby. 29 Aug 63, 1v.
Contract DA36 039AMC01477E
Unclassified report

Descriptors: (*Single crystals, Spheres), (*Spheres, Production), Yttrium, Iron, Garnet, Impurities, Crystal growth, Encapsulation, Polishes, Gallium, Limiters, Heat treatment.

Work has started on growing single crystal yttrium-iron-garnet crystals, with the first firing already assessed. Experimentation and fabrication of sphere-forming equipment is also underway this period. The problem of polishing the rough-formed sphere has received attention, the RASOR is improved; and encapsulated spheres are derived. Work is being done on a suitable transition from type N to miniature stripline, and the first stripline etched structures fabricated for limiters.

27. PROPULSION SYSTEMS

AD-427 051 Div. 27, 1
OTS price $1.10

Naval Air Test Center, Patuxent River, Md.
J34-WE-48 ENGINE, SERVICE TEST OF RIGID FUEL MANIFOLD.
Final rept.
10 Jan 64, 8p.
Task RA1200001
NATC ST31 3R64 Unclassified report

Descriptors: (*Turbojet engines, Manifolds (Engines)), Fuel systems, Tests, Thrust, Velocity, Flight testing, Climbing, Performance (Engineering), Jet training planes, Feasibility studies.

An evaluation was made to determine the feasibility and service suitability of the rigid fuel manifold system by installation and flight tests in the T-2A airplane. (Author)

AD-427 072 Div. 27
OTS price $8.10

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
RESEARCH ON UNSTEADY STALL OF AXIAL FLOW COMPRESSORS.
Final rept., Dec 62-Nov 63.
Nov 63, 82p. Rept. no. AM 1762
Contract DA49 186AMC13
Unclassified report

Descriptors: (*Axial flow compressors, Stalling), Boundary layer, Laminar boundary layer, Turbojet engines, Separation, Pressure, Theory, Velocity, Vortices, Differential equations, Rotation.

An experimental and analytical program has been undertaken to investigate the basic flow processes underlying the phenomenon of rotating stall in axial flow compressors. The complete investigation encompasses both the behavior of the unsteady boundary layer on the blade elements and the study of flow conditions upstream and downstream of a cascade or compressor stage which are consistent with a disturbance of the rotating-s/11 type. An experimental program is described which provided laminar boundary-layer velocity profiles near separation on a rotating cylinder. The cylinder was shrouded to impose an airfoil-type pressure gradient. A comparison between the experimental profiles and those predicted by a Pohlhausen-type quartic profile for a downstream-moving wall showed relatively good agreement, although the Pohlhausen analysis cannot be used to predict the separation point even approximately unless the wall velocity is very small relative to the velocity at the outer edge of the boundary layer. The data are compared to some previously published shadowgraph-smoke data obtained on the same apparatus. The comparison confirms that there is a downstream displacement of the separation point which is roughly linear in wall

plished during this report period corresponds with the detailed work outline for Phase II and included: (1) Forming, joining, and testing of the high-temperature precooler; (2) Forming, joining, and coating of the refractory metal preprecooler; and (3) Forming and joining of the low-temperature precooler. (Author)

AD-427 296 Div. 26, 17
OTS price $13.50

Foreign Tech. Div., Air Force Systems Command, Wright-patterson Air Force Base, Ohio.
CONTEMPORARY STATE OF ROLLING-MILL BUILDING IN THE USSR (Soucasny Stav Vyroby Valcovacich Zarizeni v SSSR).
by A. A. Korolev, tr. by Viktor Kobzar.
25 Sep 63, 191p.
FTD TT62 1216 Unclassified report

Trans. from Statni Nakladatelstvi Technicke Literatury Slovenske Vydavatel stvo Technickej Literatury Masgiz, Moskva, pp. 119-243, 1961.

Descriptors: (*Industrial equipment, Rolling mills), (*Rolling mills, Production), Pipes, Sheets, Ball bearings, Hot working, Cold working, Steel, Beams (Structural), Angle bars.

AD-427 333 Div. 26, 17
OTS price $6.60

Du Pont Metals Center, E. I. Du Pont De Nemours and Co. Inc., Baltimore, Md.
THE DEVELOPMENT OF OPTIMUM MANUFACTURING METHODS FOR COLUMBIUM ALLOY SHEET.
Rept. for 15 Sep 62-31 Oct 63,
by James S. Clark, Albert L. Mincher and Geroge N. Villee. 31 Oct 63, 55p.
Proj. 7 784
RTD TDR63 4236 Unclassified report

Subcontract to Crucible Steel Co. of America, Midland, Pa., Contract AF33 600 39942.

Descriptors: (*Niobium alloys, Sheets), (*Sheets, Niobium alloys), Tungsten alloys, Zirconiun alloys, Carbon alloys, Manufacturing methods, Melting, Electric arcs, Extrusion, Rolling (Metallurgy), Dispersion hardening, Mechanical properties, Heat treatment, Chemical analysis, Physical properties, Microstructure, Tensile properties, Anisotropy, Thickness, Material forming, Elasticity, Strain (Mechanics), Creep, Rupture, High temperature research, Thermal conductivity, Thermal expansion, Specific heat, Temperature.

This technical documentary report describes the development of a manufacturing process for D-43 nobium alloy sheet (Nb 10W 1Zr-0.1C, formerly called X-110). Six thousand pounds of second-melt electrodes were melted into eight-inch diameter ingots. The ingots were converted by extrusion and rolling to twenty-four inch wide sheets in three gages, 0.012, 0.018, and 0.030 in. The material was dispersion-strengthened by solution treatment at penultimate gage at final gage. Sheets of all three gages had consistently high tensile strength at elevated temperature. The sheet processing is described. (Author)

AD-427 374 Div. 26, 30
OTS price $1.10

Friez Instrument Div., Bendix Corp., Baltimore, Md.
ML-419 THERMISTOR P.E.M.
Quarterly progress rept. no. 3, 1 July-30 Sep 63, by J. T. George. 30 Sep 63, 6p.
Contract DA36 039AMC01465E
Unclassified report

Descriptors: (*Thermistors, Manufacturing methods), Radiosondes, Clay, Extrusion, Rods, Sintering furnaces, Plastic coatings, Vinyl plastics.

Activities are summarized on the improvement of the quality and processing facilities of a Thermistor Sensor for Radiosonde use. (Author)

AD-427 412 Div. 26, 10
OTS price $2.60

Ammunition Engineering Directorate, Picatinny Arsenal Dover, N. J.
ENCAPSULATING PROPELLANTS BY MEANS OF ULTRASONIC WELDING.
by Charles Zglenicki and Louis Silberman.
Dec 63, 16p.
AED TM1308 Unclassified report

Descriptors: (*Ultrasonic radiation, Welding), (*Propellant tanks, Welding), (*Welding, Propellant tanks), Encapsulation, Aluminum, Tests, Industrial equipment, Storage.

An Al container holding M5 propellant has caused functional problems because of inadequate sealing. The ultrasonic welding approach provided the most effective and durable seal. One hundred and thirty-three containers sealed by ultrasonic welding withstood 28 days temperature cycling without any detectable leakage. Thirty-five containers filled with M5 propellant were temperature-cycled and exposed to a solvent-saturated atmosphere for 11 days. Closed bomb tests of the propellant afterward indicated an effective seal was achieved. Meticulous attention to surface cleanliness is not requisite to achieve sound welds. Foil thin covers which present a minimum resistance to propagation of explosive effects can be welded. Propellant trapped in the weld zone did not ignite. Significant cost savings can be realized in high volume production over methods using special sealants. (Author)

AD-427 690 Div. 26, 14
OTS price $1.60

Lockheed Aircraft Corp., Marietta, Ga.
ESTABLISH THE GENERAL USE OF CERAMIC TOOLS IN PRODUCTION.
Interim rept.,
by C. M. Head. 4 May 63, 13p. GRMI 660 03
Contract AF33 600 36888
Unclassified report

Descriptors: (*Maintenance equipment, Production), (*Ceramic materials, Maintenance equipment), Test methods, Dies, High temperature research, Cold working, Glass textiles, Molding, Embedding substances, Valves, Tables.

Ceramic tooling is now used to satisfy the requirements of cold forming and high temperature applications. Work during this period was concerned with molding dies, embedded element hot sizing tooling, layup blocks, and production improvement methods. Four additional layup blocks are now used in production. Tool wear problems of the hot sizing die have been largely eliminated. The release of fiberglass parts from the tool has been facilitated through the development of a tool surface 'slickening' technique and an improved release agent. Ceramic molding dies, layup, blocks, and hot sizing dies are capable of producing acceptable parts. Further development is needed to standardize tool fabrication and use techniques. (Author)

In cooperation with Aerospace Corp., Los Angeles, Calif.

Descriptors: (*Rocket motors, Symposia), (*Launch vehicles (Aerospace), Design), (*Guided missiles (Surface to surface), Reliability (Electronics)), Refractory materials, Heat transfer, Pyrolytic graphite, Propellant tanks, Liquid rocket propellants, Performance (Engineering), Rocket motors (Liquid propellant), Energy management, Movable rocket motors, Gimbals, Load distribution, Aeroelasticity, Gas flow, Separation, Abort, Mechanical prroperties, Manufacturing methods, Heat shields, Wake, Damping, Electronic equipment, Malfunctions, Control systems, Manned spacecraft, Aviation safety, Astronauts, Guided missile safety, Human engineering, Sandwich construction.

Contents: Advanced Propulsion Technology; (tank outlet design for non-newtonian fluids, a method for estimating missile propulsion performance from flight data, gimbaling of rocket engines by means of flexures), Vehicle Design; (effects of various types of flow separation on launch vehicle dynamics, Reliability and Pilot Safety.

AD-427 790 Div. 27, 12, 10
OTS price $6.60

Aerojet-General Corp., Sacramento, Calif.
WEAPON SYSTEM 107A-2. PRODUCT ENGINEERING PROGRAM.
Monthly progress rept. no. 5, 1-31 Dec 63. 15 Jan 64, 1v. Rept. no. 2125A3 2 2M5
Contract AF04 694 212
Unclassified report

Report on Coated Metallic Thrust Chambers, Expandable Nozzles, Combustion Instability Scaling Concepts, Ablative Thrust Chambers.

Descriptors: (*Rocket motors (Liquid propellants), Test methods), (*Rocket motor nozzles, Performance (Engineering)), (*Combustion, Stability), (*Combustion chamber liners, Ablation), High temperature research, Thermal insulation, Refractory coatings, Model tests, Quality control, Wind tunnel models, Thrust, Combustion chambers, Regenerative cooling (Rockets), Nitrogen compounds, Tetroxides.

Contents: Coated Metallic Thrust Chambers; Expandable Nozzles; Combustion Instability Scaling Concepts; and Ablative Thrust Chambers.

AD-427 864 Div. 27, 26
OTS price $2.60

Budd Co., Philadelphia, Pa.
DEVELOPMENT OF HIGH PERFORMANCE ROCKET MOTOR CASE.
Quarterly rept. 16 May-30 Sep 63, by W. J. Hauck. 30 Sep 63, 1v.
Contract DA36 034ORD3296
Unclassified report

Descriptors: (*Rocket motors, Rocket cases), (*Rocket cases, Manufacturing methods), Steel, Nickel alloys, Mechanical properties, Aging (Materials), Tensile properties, Welds, Welding, Joints, Martensite, Heat treatment, Tests, Manufacturing methods, Cold working, Design.

Work is reported on the development of a high performance rocket motor case using 0.040 inch thick cold rolled and aged 18% nickel mar-aging steel strip. The material was vacuum melted and of the 250 composition. Higher strengths were obtained by the use of cold reduction of the strip before aging. The study was made to establish the required degree of cold reduction, to develop the welding schedules for the various joints of the assembly, and to establish the heat treating procedures for base metal, welds, and fabricated sections. This phase has been specifically designated for the fabrication of three, 20-inch diameter experimental rocket motor cases using the helically wrapped and welded design. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-427 026 Div. 28, 15
OTS price $2.60

Colorado U., Boulder.
SOME COGNITIVE AND AFFECTIVE DETERMINANTS OF DIFFERENTIATION, AND INTEGRATION,
by O. J. Harvey, Robert S. Wyer, Jr. and Jacob E. Hautaluoma. 1963, 29p. Rept. no. TR8
Contract Nonr114707
Unclassified report

Descriptors: (*Attitudes, Statistical analysis), Behavior, Group dynamics, Reaction (Psychology), Psychology, Emotions, Psychometrics, Reasoning.

Eleven representatives of 4 principal conceptual systems ranging in abstractness from rather concrete to almost completely abstract, were tested on their differentiation and integration of 3 cognitive domains (people, institutions, and inanimate objects) toward which they were highly positive, highly negative and neutral. The representatives were selected by means of the TIB (This I Believe) Test. Differentiation and integration were assessed in the domains of people and intitutions to test an assumption that these areas are differentially relevant to representatives of the 4 conceptual systems and should be differentiated and integrared differently by them. The third domain of inanimate objects were selected because of their assumed low relevance to all 4 of the conceptual systems, making this domain an appropriate control against which to compare the effects of positive and negative involvement. The F for conceptual systems was not significant for eigher differentiation or integration. The nature of the attitude toward the objects significantly affected both differentiation and integration; neutrally regarded objects were differentiated and integrated significantly better than positively regarded objects. Variation in cognitive domains had no significant effect on either differentiation or integration. (Author)

AD-427 254 Div. 28
OTS price $3.60

Boeing Co., Wichita, Kans.
VISUAL PERFORMANCE DURING WHOLE-BODY VIBRATION,
by Robert J. Teare and D. L. Parks. Nov 63, 28p. Rept. no. D3 3512 4; TR4
Contract Nonr2994 00
Unclassified report

Report on Research on Low Frequency Vibration Effects on Human Performance.

Descriptors: (*Eye, Stresses), (*Visual acuity, Performance tests), Perception, Vibration, Paranasal sinuses, Reaction (Psychology), Human engineering, Display systems, Test methods, Analysis of variance, Low frequency.

velocity when the wall is moving downstream. The magnitude of this displacement was larger in the present work than that inferred from the smoke data. (Author)

AD-427 217 Div. 27, 12, 8, 30
OTS price $2.60

Hercules Powder Co., Magna, Utah.
INVESTIGATION OF TRANSDUCERS FOR HANDLING HARNESS PADS. WEAPON SYSTEM 133B.
Final rept.,
by J. R. Ehlert. 18 Dec 63, 22p. Rept. no. MT0852 1
Contract AF04 694 270
Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Handling), (*Mounting brackets, Deformation), (*Rocket cases, Pressure), Guided missiles (Surface-to-surface), Pressure, Transducers, Strain gages, Rocket motors (Solid propellant), Containers, Test methods, Load distribution, Test equipment, Transportation, Pressure gages, Feasibility studies, Third stage motors, Safety harness.

This report documents the design and testing of transducers which could be embedded in special Minuteman stage III motor handling harness pads and indicates the pressure these pads exert on the motor. Since excessive case pressure can be detrimental to motor performance, tests were conducted to determine the feasibility of measuring these pressures by mounting transducers in rubber pads and placing them at key points on the handling harness. Two transducer models were designed and tested in two different test setups. Design No. 1 used a single-arm strain gage with three completion resistors. Design No. 2 used a four-arm strain gage in a complete bridge. The investigation demonstrated that the transducers which were developed could be embedded in the harness pads and would indicate the pressure of the pads on the motor at any desired test point. Due to the hysteresis in the rubber, measurements made with these transducers could have an error as great as 15 percent. (Author)

AD-427 344 Div. 27, 17, 30, 26
OTS price $9.60

Republic Aviation Corp., Farmingdale, N. Y.
EVALUATION OF HIGH-STRENGTH LIGHTWEIGHT LAMINATED PRESSURE VESSELS OF LAP-JOINT CONSTRUCTION.
Rept. no. 6 and Final summary rept., 1 Dec 61 - 30 Sep 63,
by G. Citrin. 30 Oct 63, 1v. Rept. no. 1825, 244 905
Contract DA30 0690RD3440; DA Proj. 59332008
WAL TR766 2 3 5 Unclassified report

Descriptors: (*Rocket cases, Joints), (*Manufacturing methods), Rocket motors, Tests, Stresses, Pressure vessels, Nickel alloys, Steel, Failure (Mechanics), Welding, Sheets, Bonding, Adhesives, Aging (Materials), Mechanical properties, Temperature, Shear stresses, Bonded joints.

An evaluation was made on the application of the adhesive-bonded cylinder design and manufacturing techniques to the development of a high performance rocket motor case. A material survey and evaluation was conducted, fabrication methods developed, and experimental test data produced for the purpose of demonstrating the high performance capabilities of the laminated lap-joint pressure vessels. Ten vessels have been fabricated and tested to failure. They were fabricated of three nominal thicknesses of material, 0.025-, 0.040-, and 0.064-inch thick maraging steel. The vessels are approximately 2 feet in diameter and range from 3 1/2 to 6 feet in length. An analysis of the results of these tests indicate it is feasible for lightweight laminated pressure vessels of lap-joint design to be considered for application to rocket motor case construction. (Author)

AD-427 354 Div. 27, 10
OTS price $11.00

Lockheed Aircraft Corp., Sunnyvale, Calif.
MODEL ENGINE FLAME SPECTRAL STUDIES VOLUME III. ENGINE PERFORMANCE COMPUTER STUDIES,
by H. J. Hemesath. Aug 63, 113p. Rept no. LMSC895304
Contract AF04 647 787
Unclassified report

Descriptors: (*Liquid rocket propellants, Tables), (*Liquid rocket fuels, Tables), (*Liquid rocket oxidizers, Tables), (*Rocket motors (Solid propellants), Combustion), Hydrazine derivatives, Hydrazine, Oxygen, Nitrogen compounds, Tetroxides, Exhaust gases, Thermodynamics, Combustion chamber gases, Flames, Liquefied gases, Programming (Computers).

As thermodynamic information on the performance of specific engines using specific fuels was found to be inadequate. A computer program was developed for combustion studies of liquid rocket propellants. These included UDMH-N2 04, hydrazine-N2 04. and RP-1-LOX fuel-oxidiza combinations. Results are tabulated. A brief analysis was made of some of the more important performance perameters for the three fuel-oxidizer combinations. Studies of mixing ratio against temperature, and composition of certain key exhaust constituents, such as H2O, CO, and CO2 reveal many features of importance to the propulsion engineer, as well as to the spectrosopist. Also considered was the study of expansion ratio with mixing ratio. (Author)

AD-427 375 Div. 27, 30
OTS price $7.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
MODEL ENGINE FLAME SPECTRAL STUDIES. VOLUME II. MODEL ENGINE RESEARCH TESTS AND FACILITIES.
Rept. for May 62-Oct 63,
by H. J. Hemesath, B. L. Coffey and C. E. Tamagni.
Aug 63, 1v. Rept. no. LMSC895304
Contract AF04 647 787
Unclassified report

Descriptors: (*Rocket motors, Propellants), Exhaust gases, Design, Oxidizers, Rocket motor nozzles, Instrumentation, Rocket propulsion, Rocket propellants, Spectra (Infrared), Injectors, Nitrogen, Infrared spectroscopy, Tests, Test facilities, Models (Simulations).

AD-427 700 Div. 27, 12, 17, 14
OTS price $21.00

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
TRANSACTIONS OF THE EIGHTH SYMPOSIUM ON BALLISTIC MISSILE AND SPACE TECHNOLOGY. HELD AT THE UNITED STATES NAVAL TRAINING CENTER SAN DIEGO, CALIFORNIA ON 16-18 OCTOBER 1963. VOLUME I. KEYNOTE ADDRESS. ADVANCED PROPULSION TECHNOLOGY VEHICLE DESIGN RELIABILITY AND PILOT SAFETY MATERIALS FOR THERMAL PROTECTION.
1963, 394p.
Unclassified report

raw score. The correlation between GSR and extent of attitude change in the case of Khrushchev's argument was (minus) .095, and for Stevenson's argument (plus) .048, neither of which approaches significance. This problem should be explored in a situation where more consistent attitude change can be induced. In the present experiment, attitude change was both too slight and too variable to permit a proper evaluation of its relationship to emotionality (Author)

AD-427 832 Div. 28
OTS price $2.60

Colorado U., Boulder.
SELF SYSTEMS, ANOMIE AND SELF ESTEEM,
by O. J. Harvey. 1963, 22p. Rept. no. TR9
Contract Nonr114707
Unclassified report

Descriptors: (*Personality, Analysis), Psychology, Motivation, Attitudes.

The perceived social self and the ratings of the Dymond Scale were used as measures of self-esteem. As hypothesized, on both measures of self-esteem System 4 Ss ranked highest, followed by Systems 3, 1 and 2. Also as predicted, on the Srole Scale, viewed as a measure of that aspect of anomie having to do with perception of self causality, System 4 Ss scored lowest, followed by Systems 3, 1 and 2. And as anticipated, on the Nettler Scale, interpreted as a measure of that aspect of anomie having to do with indentification with the American motif, System 1 Ss scored lowest followed by Systems 3, 4 and 2. Thus persons functioning in terms of the more abstract level of System 4 were higher in self-esteem than were Ss of the other systems despite being next to the lowest of the four systems in committment to or participation in the more normative American values and practices. At the same time, however, Ss functioning at the more concrete level of System 2 ranked highest of the four groups in anomie and lowest in self-esteem. In addition to showing that self-esteem does not depend on internalization of or adherence to dominant social norms, these results were interpreted as constructually validating the hypothesized characteristics of the principal self or conceptual systems posited by Homer et al. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-427 588 Div. 29, 7
OTS price $1.10

Spacelabs, Inc., Van Nuys, Calif.
DYNAMIC MEASUREMENT OF PROTECTIVE MASKS.
Monthly progress rept. no. 6, 7 Dec 63-6 Jan 64. 6 Jan 64, 4p.
Contract DA18 108AMC228A.
Unclassified report

Descriptors: (*Protective masks, Measurement), (*Test equipment, Protective masks), Discriminators, Modules (Electronic), Low frequency, Detection.

30. RESEARCH AND RESEARCH EQUIPMENT

AD-427 004 Div. 30
OTS price $8.10

Mitre Corp., Bedford, Mass.
PROGRAM DOCUMENTATION FOR MARK I STATISTICAL ASSOCIATION PROCEDURES FOR MESSAGE CONTENT ANALYSIS,
by J. Baker, R. Vicksell and J. Spiegel. Dec 63, 48p. Rept. no. SR89
Contract AF19 628 2390, Proj. 7020
ESD TDR63 259 Unclassified report

Descriptors: (*Information retrieval, Data processing systems), (*Programming (Computers), Information retrieval), Documentation, Matrix algebra, Statistical analysis, Digital computers, Magnetic tape, Analysis.

A statistical method for automatic document retrieval and message content analysis is described. The method involves building a matrix for the corpus based of word co-occurrences within sentences; this matrix is then normalized in order to eliminate what are considered to be extraneous factors. The normalized matrix is used by the retrieval algorithm to expand a set of query terms to include terms associated with them, the new set, in turn, being used to select documents from the corpus. All of these operations are performed on an IBM 7090 computer. This report gives a detailed description of the computer programs involved. (Author)

AD-427 084 Div. 30, 28
OTS price $7.60

Milan U., Italy.
TOWARDS THE MECHANIZATION OF MENTAL ACTIVITIES,
by Silvio Ceccato, Enrico Maretti, Renzo Beltrame, Pino Parini and Bruna Zonta.
30 July 63, 64p.
Contract AF61 052 362, Proj. 4599
RADC TDR63 528 Unclassified report

Descriptors: (*Artificial intelligence, Design), (*Bionics, Cybernetics), Cybernetics, Attitudes, Language, Speech, Theory.

The results are presented of some researches conducted at the Centro di Cibernetica e di Attivita Linguistiche of the University of Milan in the first half of 1963, in view of the construction of a machine that observes and describes the events of its surroundings and its internal events (''Talking Automation''). In particular the report contains studies concerning: (1) the conceptual difficulties which a program of this type gives rise to; and to which is devoted a critical part and a constructive part; (2) the block diagram of the machine and the scheme of the optical explorer with which the machine is equipped. (Author)

AD-427 103 Div. 30
OTS price $5.60

Information International, Inc., Maynard, Mass.
INVESTIGATION INTO THE SPECIAL PROGRAMMING NEEDS FOR AUTOMATED LABORATORY FOR PSYCHOLOGICAL RESEARCH,
by Edward Fredkin. 30 May 63, 45p.
Contract AF19 628 1662, Proj. 7684, Task 768401
ESD TDR63 353
Unclassified report

Descriptors: (*Data processing systems, Psychology), Programming (Computers), Feasibility studies, Training, Automation, Computers, Design, Statistical analysis, Teaching machines, Sequential analysis, Scientific research.

This report contains a summary of studies evaluating the relative importance to an Automated Psychological Laboratory and feasibility of the following: (1) Development of a statistical

Eight male volunteers were tested in the Boeing vibration facility to determine the effect of whole body vibration on the ability to read counter information. Stimuli consisted of five 5-digit counters varying in height from .05 to 0.2 inches (6 to 24 minutes visual angle at an average viewing distance of 28 inches). Vibration frequencies ranged from 1 to 27 cycles/second at each of four subjective reaction levels. Both vibration frequency and severity (reaction level) significantly affected two of the five counters. The size of the counter was a factor only if it subtended less than 12 minutes of arc. The most severe area of visual deterioration was from 12 through 23 cps. This was linked to the critical flicker frequency of the eye. (Author)

AD-427 364 Div. 28
OTS price $2.60

California U., Los Angeles.
COMMITMENT, INFORMATION UTILITY, AND SELECTIVE EXPOSURE,
by David O. Sears and Jonathan L. Freedman.
31 July 63, 23p. Technical rept. no. 12
Contract Nonr233 54, Proj. NR171 350
Unclassified report

Report on Dynamics of Social Influence.

Descriptors: (*Behavior, Theory), (*Attitudes, Social communication), Acceptability, Psychology, Students, Perception, Attitudes.

The principal hypothesis was that selectivity of voluntary exposure to information would increase with greater commitment. One hundred thirty-eight undergraduates were tested in a simulated jury setting. Strength of commitment to an initial vote was varied. Five measures of exposure were taken: ratings and rankings of article titles, duration of exposure to a persuasive communication and recall and recognition of its content. The results provided no support for the hypothesis on any of the five indices. Rather, the major effect of commitment was to depress interest in further relevant information unselectively. This reduction of interest was revealed on each of the first four indices of exposure. The results were discussed in connection with previous tests of dissonance theory hypotheses concerning voluntary exposure to information. (Author)

AD-427 365 Div. 28, 32
OTS price $2.60

California U., Los Angeles.
THE EFFECTS OF ANTICIPATED DEBATE AND COMMITMENT ON THE POLARIZATION OF AUDIENCE OPINION,
by David C. Sears, Jonathan L. Freedman and Edward F. O'Conner, Jr. 16 July 63, 23p.
Technical rept. no. 11
Contract Nonr233 54, Proj. NR171 350
Unclassified report

Report on Dynamics of Social Influence.

Descriptors: (*Public opinion, Polarization), (*Verbal behavior, Social communication), Acceptability, Group dynamics, Social science, Attitudes, Students, Theory.

The hypothesis was that anticipating a debate will polarize Ss highly committed to a partisan position, and moderate Ss weakly committed. One hundred fifty-six undergraduates were tested in a simulated jury setting. Strength of commitment to an initial vote was varied. Half the Ss were told to expect a debate, and half to expect two unrelated one-sided speeches. An opinion measure was then administered. No debates or speeches were given. Three indices of polarization were proposed: discrepancy of opinion between partisan camps, homogeneity of opinion within partisan camps, and absence of moderate Ss. The results generally supported the hypothesis, and were interpreted as reflecting defensive maneuvers undertaken prior to a debate for the purpose of minimizing dissonance-arousal. The results were also discussed in connection with other research on the effects of debates. (Author)

AD-427 398 Div. 28, 23
OTS price $1.60

Bureau of Naval Personnel, Washington, D. C.
COMPARISON OF PREDICTIVE AND CONCURRENT VALIDITIES OF BASIC TEST BATTERY TEST SCORES,
by Edward F. Alf, Jr. Oct 63, 8p.
NAVPERS TB63 12 Unclassified report

Descriptors: (*Training, Performance tests), (*Students, Aptitude test), Education, Tables.

The General Classification Test, Arithmetic Test, Mechanical Test, and Clerical Test of the Basic Test Battery, which are ordinarily administered to each recruit during his fourth day of recruit training, were experimentally readministered several months later to three samples of men immediately prior to their starting training in Electrician's Mate, Hospitalman, and Interior Communications Electrician's Class A schools. The purpose of the Experiment was to determine if test validities would be comparable for the two administrations, since a considerable economy could be effected in evaluating new tests if validities were comparable. Since four tests were tried at each of three schools, there were twelve comparisons between the early and later validity coefficients. In each case the concurrent validity coefficient was higher, the differences ranging from 0.01 to 0.09. It was concluded that in order for a test to be considered for possible use after a concurrent tryout, it must be at least 0.05 to 0.09 more valid than the operationally given tests. Possible explanations for these findings are discussed. (Author)

AD-427 682 Div. 28, 16
OTS price $3.60

Institute for Behavioral Research, U. of Maryland, College Park.
PERSUASION AND EMOTIONAL RESPONSE,
by Elliott McGinnies. Dec 63, 1v. TR2
Contract Nonr3720 01; Proj. NR171 250
Unclassified report

Descriptors: (*Galvanic skin response, Analysis), (*Attitudes, Sensitivity), Social communication, Behavior, Emotions, Verbal behavior, Autonomic nervous system, Measurement, Recording systems, Medical equipment, Correlation techniques.

Attitude change scores were examined as a function of GSR in order to determine the existence of a relationship between the two. Since there was some suggestion from the data that the subjects having the higher GSRs tended more to move in a direction consistent with the communication, 2 x 2 contingency tables were constructed in which subjects were classified as falling above or below the group mean GSR and as having attitude change scores that were consistent or inconsistent with the persuasive communication. The possibility that GSR might predict amount of attitude change regardless of direction was examined. This required a correlational analysis, in which negative attitude change scores were eliminated by adding a constant of 16 to each

ENVIRONMENTAL TESTS.
1 Oct 62, 114p.
NADCI QE C62 513 Unclassified report

Descriptors: (*Test facilities, Weapon systems), (*Environmental tests, Weapon systems), Laboratory equipment, Test equipment, Vibration, Temperature, Humidity, Shock (Mechanics), Impact shock, Acceleration, Climatology, Salt spray tests, Fungi, Rainfall, Explosions, Radiography, Specifications, Simulation.

Summaries of equipment which is available for use in the environmental testing facilities in the Quality Evaluation Laboratory at NAD Crane are presented. (Author)

AD-427 586 Div. 30, 4
OTS price $5.60

Uppsala U. (Sweden).
RESEARCH ON REACTIONS BETWEEN EXCITED MOLECULES AND MOLECULAR FRAGMENTS.
Final technical rept. Feb-Apr 62,
by Stig Claesson. 13 Sep 63, 33p.
Grant AF EOAR61 38
AFOSR J1584 Unclassified report

Descriptors: (*Photochemistry, Laboratory equipment), (*Electric discharges, Laboratory equipment), (*Flash lamps, Photochemistry), (*Laboratory equipment, Photochemistry), Capacitors, Electrodes, Absorption spectrum, Oxidation, Electrical equipment, N-leterocyclic compounds, Ketones, Free radicals, Excitation, Molecules.

AD-427 679 Div. 30
OTS price $1.10

System Development Corp., Santa Monica, Calif.
OPERATING INSTRUCTIONS AND OUTPUTS OF THE J-X.2 ONE-PASS COMPILER AND LOADER,
by E. Book and H. Bratman. 18 Nov 63, 7p.
Rept. no. TM970 003 01A
Unclassified report

Descriptors: (*Digital computers, Instruction manual), Magnetic tape, Input-output devices, Programming (Computers), Machine translation, Compilers.

The J-X.2 compiler is a one-pass compiler which runs on the IBM 7090 and produces absolute binary 7090 instructions. The language processed is a subset of JOVIAL J-2 and J-3. (Author)

AD-427 750 Div. 30, 2, 33
OTS price $8.10

Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency, Fort Belvoir, Va.
ENGINEERING DESIGN TEST REPORT; INERTIAL SURVEYING EQUIPMENT (ISE),
by Robert T. Flowe. 7 Oct 63, 81p.
Task 1S643315D57811
GIMRADA 16TR Unclassified report

Descriptors: (*Surveying, Instrumentation), (*Inertial navigation, Surveying), Design, Tests, Position finding, Azimuth, Experimental data, Performance (Engineering), Performance tests, Ground position indicators, Helicopters, Reliability (Electronics).

This report covers the development and engineering design tests of a prototype surveying instrument which utilizes inertial techniques for the determination of position, azimuth, elevation, and grid convergence. The Inertial Surveying Equipment (ISE) is essentially an inertial system which uses a special data correction technique to attain performance characteristics suitable for artillery surveys. The ISE can be used in either a ground vehicle or a helicopter. The report concludes that: (a) The prototype ISE, in system tests, demonstrated the feasibility of using an inertial system that incorporates a data refinement philosophy for performing surveys of 1-hour duration to an enroute accuracy of about 25 meters mean radial error in position. (b) The prototype ISE is not suitable for engineering tests because of the sensitivity of the computer subsystem to vibration and shock under dynamic test conditions. (c) Improvements in performance, reliability, and ease of operation and maintenance can be obtained in future equipment by optimizing stable platform performance, data refinement techniques, and gyroscope and integrator trimming procedures and by following good human engineering and reliability practices. (Author)

AD-427 751 Div. 30, 9
OTS price $9.60

Ohio State U., Columbus.
THE ARL THIRTY-INCH HYPERSONIC WIND TUNNEL INITIAL CALIBRATION AND PERFORMANCE,
by N. E. Scaggs, W. Burggraf and G. M. Gregorek.
Dec 63, 101p.
Contract AF33 657 8106; Proj. 7065; Task 706501
ARL 63 223 Unclassified report

Descriptors: (*Hypersonic wind tunnels, Calibration), Test facilities, Design, Operation, Performance (Engineering), Wind tunnel nozzles, Test equipment, Heaters, Diffusers, Vacuum apparatus.

The ARL 30" Hypersonic Wind Tunnel is a large blow-down facility that uses a methane-oxygen fired zirconia pebble bed to heat the air prior to expansion to flow Mach numbers ranging from 16 to 22 at free stream Reynolds numbers approaching 10 to the 6th power/ft. This report describes the components of the facility, discusses the operation of the tunnel, and presents calibrations of two conical nozzles, developing approximately M = 16.5 and M = 18.5. The performances of the heater, diffuser and vacuum system are evaluated and the operational experiences gained during the initial operating period are reviewed. To aid in planning test programs for the facility, an appendix is included that details the performance of the facility, including the wind tunnel performance with a planned expansion of the vacuum station. (Author)

AD-427 771 Div. 30
OTS price $3.00

Adaptronics, Inc., Alexandria, Va.
THEORY OF PROBABILITY STATE VARIABLE SYSTEMS, VOLUME VI: PERCEPTION, DECISION-MAKING, AND ACTION.
Final rept., 15 Oct 61-14 Oct 62,
by R. J. Lee. Dec 63, 192p.
Contract AF33 657 7100; Proj. 4160; Task 416004
ASD TDR63 664, vol. 6
Unclassified report

Descriptors: (*Reading machines, Pattern recognition), (*Artificial intelligence, Input-output devices), Data processing systems, Bionics, Decision making, Learning, Theory, Perception, Actuators, Sensory mechanisms, Networks, Control systems, Game theory, Cybernetics.

package for real-time data analysis to permit modifications of an on-going experiment; (2) Development of a statistical package for conventional data analysis and display; (3) Use of a computer as a teaching machine to prepare subjects for experiments; (4) Use of a computer to train programmers and experimenters; (5) The computer's role in determining tactics within an experiment; (6) Use of a computer to investigate the strategy of experimentation, e.g., simulation of subjects to allow exploration of experimental designs; (7) Advantages and disadvantages involved in the use of the various programming languages, e.g., Decal, Macro, Frap, Algol, Fortran, Cobol, and specially written languages; (8) Techniques for automatically discovering interesting relations in data. (Author)

AD-427 116 Div. 30, 16
OTS price $5.60

Mitre Corp., Bedford, Mass.
FIRST CONGRESS ON THE INFORMATION SYSTEM SCIENCES SESSION 6. SELF-ORGANIZING AND ADAPTIVE INFORMATION SYSTEMS.
Nov 63, 51p. Rept. no. SS 6
Contract AF33 600 39852, Proj. 704
ESD TDR63 474 6 Unclassified report

Descriptors: (*Data processing systems, Operation), (*Decision making, Data processing systems), (*Pattern recognition, Diagnosis), (*Electrocardiography, Pattern recognition), Theory, Eyes, Ears, Information retrieval.

Contents: Multi-Level Systems and Information Problems; and Eyes and Ears for Computers.

AD-427 222 Div. 30
OTS price $8.60

United States Time Corp., Irvington, N. Y.
INTEGRATING GYRO.
Final rept. 29 May 62-29 May 63.
17 July 63, 1v. Rept. no. 620
Contract NOw62 0919c
Unclassified report

Descriptors: (*Gyroscopes, Integrators), Costs, Tables, Miniature electronic equipment, Tests, Stability, Drift, Test methods, Mechanical drawings, Damping, Torque.

Research concerned the design and development of a low cost, small size (1 inch dia by 2 1/8 inch long) integrating gyro. Two experimental prototypes were constructed and tested. On the basis of the test results as well as of the design studies, four delivered gyros were fabricated. The most important performance parameters of these units are summarized; other characteristics are shown. (Author)

AD-427 332 Div. 30, 14
OTS price $1.60

California U., Los Angeles.
A NEW METHOD FOR THE RAPID DETERMINATION OF GLASS TRANSITION TEMPERATURES,
by A. Eisenberg and E. Rovira. 1 Dec 63, 7p.
TN1
Contract Nonr23387; Proj. NR051 453
Unclassified report

Descriptors: (*Transition temperature, Determination), (*Strain gages, Transition temperature), Acrylic resins, Glucose, Selenium, Sulfur, Alcohols, Cooling, Rubber, Strain (Mechanics).

The method proposed is based on the response of a strain sensor (which is in intimate contact with the material) to the changes occurring in the material as it passes through the glass transition. While it cannot be used with powdery samples, it is otherwise restricted only by the temperature characteristics of the strain gauge, and can thus be used on any amorphous material with which the gauge can be brought into very intimate contact. There are two different methods of applying the strain gauge to the material. For systems in which the viscosity is sufficiently low (less than 100 poises) at temperatures at which the material is stable (this immediately excludes some high polymers) the gauge, together with a small thermocouple, is simply immersed in the liquid, and the container (usually a simple test tube) is cooled to below the Tg value. By this method, the Tg values of methyl methacrylate, glucose, selenium, sulfur and glycerine were determined. Whenever the embedding of the gauge and thermocouple is not convenient (due to possible decomposition of the material at the high temperatures needed to achieve low enough viscosities), the strain gauge can be glued to the material, be it a rubber or a glass, by means of epoxy cement or any other suitable glue, and again any convenient heating or cooling method employed. (Author)

AD-427 336 Div. 30
OTS price $2.50

Winslow Labs., Rensselaer Polytechnic Inst., Troy, N. Y.
DEVELOPMENT OF SOIL PRESSURE GAGES,
by Emmericus C. W. A. Geuze and Robert Y. K. Cheng. 1 June 63, 100p.
Contract NBy32195
Unclassified report

Descriptors: (*Pressure gages, Soils), (*Soils, Pressure gages), Soil mechanics, Measurement, Underground structures, Distribution, Pressure, Shear stresses, Stresses, Stability, Friction, Spheres, Tests.

AD-427 393 Div. 30, 8, 25
OTS price $13.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SELFEXCITED OSCILLATIONS,
by A. A. Kharkevich. 9 Dec 63, 181p.
FTD TT63 748 Unclassified report

Trans. from Gosudarstvennoye Izdatel'stvo Tekhniko-Teoreticheskoy Literatury pp. 1-170, 1953.

Descriptors: (*Oscillation, Excitation), Energy, Physics, Engineering, Statics, Dynamics, Pistons, Friction, Vibration, Docks, Feedback, Negative resistance circuits, Analysis, Relaxation oscillators, Hydraulic systems.

The book contains a discussion of the physical bases for selfexcited oscillations. The discussion, given without mathematical analysis, is based on energy considerations. The volume considers a large number of diverse examples of selfexcited oscillations encountered in physics and engineering. The book is designed for a broad group of readers having a general knowledge of physics and interested in oscillatory phenomena. (Author)

AD-427 566 Div. 30
OTS price $9.60

Naval Ammunition Depot, Crane, Ind.
CURRENT AND PLANNED CAPABILITIES FOR CONDUCTING

produced is then measured by observing the mirror image deflection on a scale. Using this measured angle of deflection, dimensions of the holes, their distances from the axis of the suspension and the torsional rigidity of the fiber, one can caluculate the vapor pressure. The advantages of the method are: (1) it gives an absolute measure of the vapor pressure, (2) only a small amount of substance is required, (3) knowledge of the molecular weight of the material is unnecessary in order to calculate the vapor pressure. A static vacuum system was designed and constructed to be used with the Torsion-Effusion apparatus. It consisted of a mechanical fore pump, 3-stage mercury diffusion pump, liquid nitrogen traps and a cold cathode ionization gage. The applications of the vapor pressure measurements are also discussed. (Author)

AD-427 830 Div. 30
OTS price $1.60

Coordinated Science Lab., U. of Illinois, Urbana.
EFFECTS OF ELECTRON-SURFACE INTERACTION IN IONIZATION GAUGES,
by W. C. Schuemann, J. L. de Segovia and D. Alpert. Aug 63, 18p. Rept. no. R180
Contract DA36 039AMC02208, Proj. 3A099 25 004
Unclassified report

Descriptors: (*Ionization gages, Nonlinear systems), Errors, Oxygen, Electron bombardment, Ions, Gas analysis, Measurement.

A systematic study of an anomalous nonlinearity in ionization gauges was made, indicating the magnitude of possible errors in ionization gauge readings. The errors are particulary enhanced after O2 has been introduced into the system. Evidence was provided for interpreting the effect as due to dissociative ionization by electron impact at the grid surface. At low values of grid current, there is an enhanced rate of production of such ions accompanied by a reduced rate of collection in a Bayard-Alpert gauge. The anomalous readings in ionization gauges can be reduced greatly by thorough outgassing of the grid by electron bombardment. Thereafter, operation at electron currents of 5 ma or greater gives reliable readings. In the presence of O2 a number of other effects may be present to give erroneous ionization gauge readings; in particular, composition of the gas may be altered, both by chemical reactions at the hot filamant and by electron bombardment of adsorbed gases. (Author)

AD-427 840 Div. 30
OTS price $5.60

Cornell U., Ithaca, N. Y.
DETERMINATION AND DETECTION OF FEATURES IN PATTERNS,
by H. D. Block, N. J. Nilsson and R. W. Duda. Dec 63, 52p.
Contract AF30 602 2943, Proj. 5581, Task 558104
RADC TDR63 467 Unclassified report

In cooperation with Stanford Research Inst., Menlo Park, Calif., Contract Nonr343800.

Descriptors: (*Teaching machines, Training), (*Artificial intelligence, Teaching machines), (*Training, Pattern recognition), (*Pattern recognition, Detection), Algebra, Mathematical analysis, Programming language, Determination.

Feature determination as a method of training the first layer of weights in a two layer learning machine (Perceptron) is investigated. The problem is viewed as one of examining a set of patterns and determining a set of simpler patterns, or features, so that each of the original patterns can be formed by superposing the features. While the general problem of finding a minimal set of features was not solved, two algorithms were given that solve the problem for restricted pattern sets. (Author)

AD-427 872 Div. 30, 16, 15
OTS price $3.50

Adaptronics, Inc., Alexandria, Va.
THEORY OF PROBABILITY STATE VARIABLE SYSTEMS -- VOLUME I -- SUMMARY AND CONCLUSIONS.
Final rept., 15 Oct 61-14 Oct 62,
by R. J. Lee, L. O. Gilstrap, Jr., R. F. Snyder and M. J. Pedelty. Dec 63, 243p.
Contracts AF33 657 7100, AF33 657 8646, Proj. 4160, Task 416004
ASD TDR63 664, vol. 1 Unclassified report

Descriptors: (*Nerve cells, Simulation), (*Bionics, Nerve cells), (*Automation, Theory), Networks, Probability, Mathematical analysis, Bibliographies, Programming (Computers), Decision making, Perception, Teaching machines.

A summary is presented of the other five volumes of this report which are mathematical and computer simulation studies of PSV systems. Particular emphasis is here placed upon Neurotron artificial nerve cells and networks of these artificial nerve cells, which, together with their goal circuits, probably form the most advanced type of PSV systems. This volume presents a brief discussion of the subject matter covered in the other volumes and contains conclusions drawn from the other volumes. (Author)

AD-427 880 Div. 30, 15
OTS price $9.10

Air Force Cambridge Research Labs., Bedford, Mass.
THE DECOMPOSITION OF FINITE STATE MACHINES,
by Thomas V. Griffiths. Nov 63, 101p.
Proj. 4641
AFCRL 63 543 Unclassified report

Master's thesis.

Descriptors: (*Digital computers, Sequential analysis), Mathematical models, Number theory, Combinatorial analysis, Algebra, Sequences, Data processing systems, Electronic accounting machines, Switching circuits.

A finite state machine is decomposed into the Cartesian product of two smaller finite state machines. A notation is developed to treat the problem, and principal results of Hartmanis and Yoeli are given with some extensions by the author. An addition operation on finite state machines is defined and it is shown that the product operation distributes over the addition operation. It is explained that the output-free finite state machine is equal to the sum of a set of single-input, output-free finite state machines. Some of the properties of transformation finite state machines, a special case of single-input, output-free finite state machines, are discussed. The transformation finite state machine may be modeled by a transformation on a finite set. Some theorems are proved relating the structure of two transformation finite state machines to the structure of their product.

This report discusses approaches whereby Neurotron Networks can be used to provide pattern recognition, autonomous decision-making, and action. The intent is to illustrate the versatility of Neurotron networks, and their potential application to actual problems, and to provide a framework for the mathematical studies of PSV systems. To illustrate pattern recognition, an artificial fovea with jitter analogous to the human eye is described, and how this, together with a Neurotron network, can learn to assign meaning to symbols, including the ability to learn to recognize hand-printed letters. To illustrate autonomous decision-making, it is shown how a Neurotron network can develop its own strategy for playing chess. To illustrate action, it is shown how a Neurotron network can learn to control an arm and hand with visual, tactile, and kinesthetic feedback, and it is shown how a Neurotron network can learn to drive suitable output devices to mimic a simple tune. (Author)

AD-427 807 Div. 30, 20
OTS price $17.00

ITT Research Inst., Chicago, Ill.
FEASIBILITY STUDY FOR A LARGE BLAST SIMULATOR -- VOLUME I.
Final rept., 1 May 61-30 June 62,
by A. H. Wiedermann, J. J. Swatosh, Jr. and E. Guillard. Jan 64, 253p. Rept. no. T6035
Contract DA49 146XZ064
DASA 1321 Unclassified report

Descriptors: (*Nuclear explosions, Models (Simulations)), (*Shock tubes, Geometric forms), (*Blast, Simulation), Feasibility studies, Shock waves, Gas flow, Rocket propellants, Costs, Nuclear physics laboratories, Stresses, Design, Soils, Configuration, Test methods, Concrete, Experimental data.

The object of this research program is to determine the most feasible means of obtaining a nuclear blast simulator which will reproduce the transient flow field associated with the 500 psig. overpressure range of large nuclear weapon detonations. The blast simulator is of the general purpose type and is characterized by a traveling shock wave followed by a flowing gas. The test section is of the order of 25 x 50 feet in section and contains, in addition to the gas flow region, a soil container or region in which air induced stress waves can be generated. Two concepts were considered the most feasible. One is the standard shock tube concept which consists of a long tube, closed at one end, in which explosives are distributed over a large region and detonated. The other is the space variable energy input shock tube concept which consists of a long tube, open at both ends, in which explosives are distributed in a non-uniform manner. The resulting detonation yields longitudinal pressure gradients which are similar to the wave forms of interest. Both of these concepts simulate the overpressure and dynamic pressure variation in the test section satisfactorily. Cost estimates for these two concepts were made for a variety of facility sizes and blast wave parameters. (Author)

AD-427 810 Div. 30, 9
OTS price $8.10

Aerophysics Lab., Mass. Inst. of Tech., Cambridge.
FURTHER EVALUATION OF A MAGNETIC SUSPENSION AND BALANCE SYSTEM FOR APPLICATION TO WIND TUNNELS.
Technical rept.,
by Eugene E. Covert and Edward Lee Tilton, III. Dec 63, 74p.
Contract AF33 616 7023, Proj. 7065, Task 7065 01
ARL 63 226 Unclassified report

Report on Aerospace Simulation Techniques Research.

Descriptors: (*Hypersonic wind tunnels, Suspension devices), (*Suspension devices, Magnetic fields), Magnetic fields, Wind tunnel models, Model tests, Servomechanisms, Direct current, Angle of attack, Yaw, Wind, Temperature, Pressure, Statics, Dynamics, Calibration.

The application of a magnetic suspension and balance system to static and dynamic wind tunnel testing is discussed. The equipment and experiments are described and an analysis of the performance of the system is given. (Author)

AD-427 817 Div. 30, 15
OTS price $1.10

System Development Corp., Santa Monica, Calif.
APPLICATIONS OF SIMULATION IN COMMAND AND CONTROL SYSTEMS,
by Milton G. Holmen. 5 Nov 63, 8p. Rept. no. SP1455
Unclassified report

Descriptors: (*Command and control systems, Simulation), (*Models (Simulations), Command and control systems), Input-output devices, Training, Effectiveness, Operation, Algebra, Mathematical analysis.

States that simulation is necessary in every part of the system development process, beginning with the use of computer-operated models in the concept-development stage, and leading to the regular use of simulated inputs for training, procedural development, confidence testing, evaluation and system evaluation. Distinguishes between simulation and model-building by describing a model as a tool which may have many uses, of which simulation is one. Reports that application of a computerized model for simulation is generally called ''algorithmic simulation'', in contrast to ''operational simulation,'' in which an operational system is used in a simulated environment or simulation is applied with an operational environment. Discusses different forms of simulation available for use in the system development process. (Author)

AD-427 821 Div. 30
OTS price $.75

Rock Island Arsenal Lab., Ill.
THE TORSION-EFFUSION APPARATUS FOR THE MEASUREMENT OF VAPOR PRESSURE,
by Peter Martin, Jr. 26 Nov 63, 19p.
Proj. DA1A0 24401A109
RIAL 63 3891 Unclassified report

Descriptors: (*Vapor pressure, Measurement), (*Test equipment, Design), Gas discharges, Organic compounds, Torque, Checkout procedures, Test methods.

The Balson Torsion-Effusion method is based on the measurement of the recoil force developed by effusion gas. The apparatus consists of an effusion vessel suspended by a fiber in such a way that two escaping gas streams tend to twist the fiber in the same direction. The torque

ed. by Horst Mendershausen. Jan 64, 162p.
Memo no. RM3078PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Political science, Reviews), (*Foreign policy, Periodicals), National defense, Defense systems, Foreign policy, Nuclear warfare, Communists, Armed Forces (Foreign), Education, Rockets, Military intelligence.

This Memorandum presents a series of translations of foreign journal and newspaper articles that appeared in the years 1962 and 1963. The articles -- in French, German and Russian -- dealt with political and military matters of considerable interest at the time, the state of East Germany after the building of the Berlin wall, Soviet boasts of global rockets, German views on defense, the Berlin crisis, the Cuban crisis, the frictions in the Atlantic Alliance after January 1963, and France's pursuit of a national nuclear armament. (Author)

AD-427 147 Div. 32
OTS price $1.10

RAND Corp., Santa Monica, Calif.
REVIEW OF ''THE POLITICS OF SCARCITY'' BY M. WEINER FOR THE AMERICAN ECONOMIC REVIEW,
by George Rosen. Jan 64, 5p. Rept. no. P2854
Unclassified report

Descriptors: (*Political science, Economics), (*Economics, Foreign policy), Public relations, Attitudes, Public opinion, Theory, Growth, Labor, Industries, Population, Students, Rural areas, Commerce, Decision making.

AD-427 226 Div. 32, 22
OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
1962, SELECTED OFFICIAL PUBLICATIONS. PROFESSIONAL PAPERS AND PATENTS.
Sep 63, 75p.
NOTS TP3120 Unclassified report

Descriptors: (*Ordnance, Reports), (*Abstracts, Ordnance), Patents, Periodicals, Bibliographies.

This booklet lists official publications released to the Office of Technical Services for dissemination under Public Law 776, professional papers published in the open literature, and U.S. Patents. The official publications are listed by series number (NAVORD Report, NAVWEPS Report, NOTS TP); the professional papers, alphabetically by first author; and the patents, by U. S. Patent Number. An author index appears at the back. (Author)

AD-427 678. Div. 32
OTS price $1.60

System Development Corp., Santa Monica, Calif.
AN INFORMATION CENTER FOR LAW ENFORCEMENT,
by Carlos A. Cuadra, Herbert H. Isaacs, Frances Neeland and Everett M. Wallace. 2 Jan 64, 16p. Rept. no. TM1670
Unclassified report

Descriptors: (*Documentation, Criminology), (*Criminology, Documentation), Data processing systems, Indexes, Operation, Costs, Textbooks, Bibliographies, Vocabulary, Abstracts, Personnel, Subject indexing, Automation.

This paper was prepared at the request of the Subcommittee on Research of the Peace Officers' Association of the State of California. It describes the characteristics of a typical Information Center to serve the members of the Association. The potential services and costs of such a center are discussed. Several recommendations are made for an initial study to define system requirements and, if appropriate, for the tasks necessary to establish the center. (Author)

AD-427 681 Div. 32
OTS price $1.60

Numerical Analysis Research, U. of Calif., Los Angeles.
ECONOMICS OF LANGUAGE,
by Jacob Marschak. Nov 63, 15p. WP44
Contract Nonr233 75
Unclassified report

Descriptors: (*Language, Economics), (*Verbal behavior, Performance tests), (*Social communication, Language), Vocabulary, Dictionaries, Communication systems, Verbal behavior, Costs.

AD-427 757 Div. 32, 28, 26
OTS price $1.60

Princeton U., N. J.
ANALYSIS OF THE DEVELOPMENT OF PLANNING OF 3-MAN GROUPS IN A SIMULATED ECONOMIC ENVIRONMENT.
Final rept., 15 June 61-30 Sep 63,
by John L. Kennedy. 30 Sep 63, 9p.
Contract Nonr185836; Proj. NR177 264
Unclassified report

Descriptors: (*Economics, Analysis), (*Management engineering, Industrial psychology), (*Industrial psychology, Management engineering), Design, Simulation, Social communication, Performance tests, Quality control, Wages, Group dynamics, Behavior, Labor, Game theory, Decision making, Tables, Control, Costs, Test methods.

'Analysis of the Development of Planning of 3-Man Groups in a Simulated Economic Environment' was an attempt to utilize this methodology of environment simulation to study the developmental sequence of plans or strategies employed by 40 3-man teams of Princeton undergraduates and graduate students competing in a series of specially-designed business games. The typical sequence of a game involved the pre-test of the participants, an assembly into 3-man teams on the basis of explicit criteria, and then a 10-12 week sequential series of game sessions in which the teams organized themselves and conducted competitive operations during a 2 or 3-hour weekly laboratory session. Comparative rank in weekly and cumulative earnings, communicated to all participants, was the formal reinforcement or feedback as the teams competed to finish first in comparative cumulative game dollars. (Author)

AD-427 779 Div. 32
OTS price $1.60

RAND Corp., Santa Monica, Calif.
THE IMPACT OF ARMS REDUCTION ON RESEARCH AND DEVELOPMENT,
by Richard R. Nelson. Jan 64, 189p. Rept. no. P 2849
Unclassified report

Descriptors: (*Armament, Reduction), Economics, Armed Forces budgets, Scien/ific research, Industrial relations.

Generating functions for transformation finite state machines are introduced, and it is shown how these may be used in obtaining the decomposition of a transformation finite state machine as the product of two smaller transformation finite state machines if such a decomposition exists. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-427 097 Div. 31
OTS price $1.60

Naval Applied Science Lab., Brooklyn, N. Y.
REPORT OF INSPECTION OF NEOPRENE COATING APPLIED TO ''WAKE-ADAPTED'' PROPELLER OF USNS AMERICAN EXPLORER (TAO-165).
20 Jan 64, 6p.
Proj. 9300 17, SF 013 13 01, Task 0906
NASL TM3 Unclassified report

Descriptors: (*Propellers (Marine), Rubber coatings), (*Rubber coatings, Propellers (Marine)), Synthetic rubber, Tankers, Failure (Mechanics), Erosion, Cavitations, Adhesion.

A neoprene coated propeller was installed on the USNS American Explorer (TAO-165) to determine the cavitation erosion protection afforded by the coating. The ship was operated 3 1/2 months and the propeller and coating were then inspected. The method of applying the coating, appearance of the propeller and coating after 3 1/2 months operation, performance of the propeller and other methods considered for preparing the propeller far further service are discussed.

AD-427 286 Div. 31
OTS price $8.60

Baker Mfg. Co., Evansville, Wis.
THE DESIGN OF HYDROFOIL BOATS WITH PARTICULAR REFERENCE TO FULLY SUBMERGED HYDROFOILS,
by J. G. Baker. 14 Oct 59, 1v.
Contract Nonr238 01
Unclassified report

Descriptors: (*Hydrofoil boats, Design), (*Hydrofoils, Design), Drag, Configuration, Draft indicators, Computers, Marine engines, Control, Underwater, Pitch (Motion), Acceleration, Roll, Stabilization, Control systems, Tests, Meters, Equations, Mounting brackets, Hydraulic servomechanisms, Hydraulic systems.

Two 24-foot hydrofoil model test boats were designed and constructed on the basis of long term studies. The first boat known as High Pockets has a surface piercing hydrofoil system suitable for Froude Numbers below about 0.5. Additional conclusions based on High Pockets' tests are contained in this report. The second boat, known as High Tail, has an angle controlled fully submerged hydrofoil system suitable for Froude Numbers above about 0.5 is reported on herein. The functional form of the hydrofoil angle control was synthesized mathematically largely on the basis of zero Flying Draft Variance in long waves. This functional form is expressed by Specific Coupling Equations. Control parameters for the Specific Coupling Equations were selected to minimize the Hydrofoil Draft Increment for a given limiting vertical acceleration on the basis of a mathematical analysis of High Tail's vertical motions controlled in accordance with the Specific Coupling Equations while flying in idealized waves. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-427 024 Div. 32
OTS price $1.60

RAND Corp., Santa Monica, Calif.
EXPORTS, CAPITAL IMPORTS AND ECONOMIC GROWTH,
by Benton F. Massell. Jan 64, 9p. Rept. no. RM3856RC
Unclassified report

Descriptors: (*Economics, Growth), (*Commerce, Theory), Analysis, Costs, Mathematical analysis.

In a recent paper, R. J. Ball presented a theoretical examination of the effect of exports and of capital imports on an economy's rate of economic growth. Ball found that capital imports enable an economy to increase its rate of growth without incurring any debt burden. He found also that an increase in exports may reduce the rate of growth. The present study examines the model and the assumptions underlying Ball's conclusions. Both of Ball's conclusions are seen to follow from quite unacceptable assumptions; a more realistic set of assumptions yields entirely different results. (Author)

AD-427 061 Div. 32, 2
OTS price $6.60

RAND Corp., Santa Monica, Calif.
PRODUCTION OF FOOD CROPS ON THE CHINESE MAINLAND: PREWAR AND POSTWAR,
by T. C. Liu, C. Twanmo and K. C. Yeh. Jan 64, 56p. Memo. no. RM3569PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Food, Production), (*Agriculture, Communists), (*Economics, Food), Tables, Mathematical predictions, Statistical data, Commerce.

A preliminary attempt is presented to derive a new set of estimates of the production of certain important food crops. Any such attempt is necessarily made difficult by a paucity of data, a difficulty that can be overcome only by making a number of bold assumptions. The present work may stimulate others to study this important problem. The figures on the production of food crops given by the Communists for the postwar years are recapitulated. The figure for 1954 is 3,390 million piculs (170 million metric tons), which, the Communists claim, represents a 13 per cent increase over the prewar peak production. For their estimate of prewar peak production -- 3,000 million piculs in 1936 -- the Communists relied on estimates made by the National Agricultural Research Bureau of the National Government. In Section II the Bureau's figures are shown to be underestimates. On the basis of the Bureau's data and the figures given in Buck's study, a preliminary estimate of the average annual production of food crops during the prewar period 1929-1937 will be derived in Section III. This estimate amounts to 3,540 million piculs (177 million metric tons). The output claimed by the Communists for 1954 is therefore less than our estimate of average prewar output. (Author)

AD-427 101 Div. 32
OTS price $12.00

RAND Corp., Santa Monica, Calif.
TRANSLATIONS OF POLITICAL INTEREST, 1962-1963,

experimental variables could be evaluated within the context of an operational environment. An air traffic system was chosen because it is typical of information-processing, decision-making systems. A future environment was chosen so as to provide greater likelihood of cooperative man-computer information processing. Based upon a systematic survey of authorative forecasts, a set of assumptions was made about the future air traffic environment and the structure and operating characteristics of a future terminal system. These assumptions provided a framework for the design of the laboratory model. The laboratory subsystem exercises control over all airborne aircraft in the terminal area. It is the performance of this subsystem (the Terminal Control Center located at the San Francisco airport) which was studied. The center is manned by six people: two local controllers, two conversion controllers, a traffic coordinator, and an assistant to the supervisor. (Author)

AD-427 680 Div. 33, 30
OTS price $2.60

System Development Corp., Santa Monica, Calif.
TERMINAL AIR TRAFFIC CONTROL AND PROBLEMS OF SYSTEM DESIGN,
by L. T. Alexander and E. H. Porter. 1 Oct 63, 19p. Rept. no. TM639 008 00
Unclassified report

Descriptors: (*Terminal flight facilities, Air traffic control systems), (*Air traffic control systems, Automation), Data processing systems, Operations research, Models (Simulator), Decision making, Design, Theory, Digital computers, Model tests, Performance, Effectiveness.

Terminal air traffic control must turn toward automation soon. The design of an effective control system may be determined most efficiently by initial simulation in the laboratory. That it is possible to simulate such a system in the laboratory is demonstrated by the Terminal Air Traffic Control System established in SDC's Systems Simulation Research Laboratory. The system was tested in a series of 24 two hour runs under different traffic configurations and input patterns. The results of these runs suggest that prescheduling of approach paths is not as efficient as permitting controllers to determine the approach paths according to the situation of the moment. Safety, orderliness and expeditiousness measures were programmed into the computer and were taken during the simulated operations. Such measures, taken during actual operations, could be adapted to alert operators when the system is approaching some undesired level of effectiveness. (Author)

Division 32 - MISCELLANEOUS ARTS AND SCIENCES

AD-427 780 Div. 32, 18
OTS price $1.60

RAND Corp., Santa Monica, Calif.
THE INDO-SOVIET MIG DEAL AND ITS INTERNATIONAL REPERCUSSIONS,
by Ian C. C. Graham. Jan 64, 18p. Rept. no. P2842 Unclassified report

Descriptors: (*Air Defense Command, Foreign policy), Industrial production, United Nations, Defense systems, Armed forces (Foreign), Economic warfare, Political science.

AD-427 781 Div. 32
OTS price $1.10

RAND Corp., Santa Monica, Calif.
THE SPECIFICATION AND SELECTION OF MILITARY INFORMATION PROCESSING SYSTEMS,
by L. C. Hobbs and L. J. Craig. Jan 64, 6p. Rept. no. P2815
Unclassified report

Descriptors: (*Data processing systems, Selection), Military organization, Specification, Military requirement, Analysis.

The military and industry jointly and separately have important jobs to perform in the specification and selection of military information processing systems. Each should attempt to accomplish those tasks for which it is best suited. The military, as the user and customer, should concentrate on the requirements analysis in order to determine both the detailed perormance and operational requirements that the proposed system must meet. Industry should concentrate on designing a system to generate the required outputs from the available inputs within the given time constraints while meeting the operational requirements. A proper and adequate requirements analysis performed by the military might help eliminate industry's sometimes inadvertent attempts to reorganize the military or attempt to redirect their assigned mission to bring into consonance their view of the requirements and objectives of the systems design. (Author)

AD-427 856 Div. 32
OTS price $3.60

Department of Justice, Washington, D. C.
REPORT OF THE ATTORNEY GENERAL PURSUANT TO SECTION 2 OF THE JOINT RESOLUTION OF AUGUST 7, 1959, CONSENTING TO AN INTERSTATE COMPACT TO CONSERVE OIL AND GAS,
by Robert F. Kennedy. 15 May 63, 31p.
Unclassified report

Descriptors: (*Economics, Industries), (*Industrial production, Oils), (*Industrial production, Gases), (*Industries, Quality control), Tables, Costs, Commerce.

This report sets out (1) a description of this Department's relevant surveillance responsibilities and the action taken in conformance therewith; (2) a description of the crude oil supply control system which is the concern of the Compact and the surveillance requirement; (3) a statement of the major problems of oil industry competition and pricing which our inquiry relates to the operation of this control system. (Author)

33. TRANSPORTATION

AD-427 006 Div. 33, 32
OTS price $1.60

RAND Corp., Santa Monica, Calif.
ARE WE WILLING TO PAY FOR CONGESTION-FREE TRANSPORTATION,
by Richard H. Haase. Jan 64, 12p. Rept. no. P2813
Unclassified report

Descriptors: (*Transportation, Costs), (*Urban areas, Transportation), Time, Population, Decision making, Analysis, Distribution.

AD-427 060 Div. 33, 5, 8
OTS price $8.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
TEST AND EVALUATION OF OCEANIC STATION VORTAC. Final rept.
by S. E. Taggart and J. M. Del Balzo. Jan 62, 1v. Task 115 4 2T
Unclassified 9eport

Descriptors: (*Radio beacons, Shipborne), (*Radio navigation, Radio beacons), (*Air traffic control systems, Oceans), Direction findings, Ship antennas, Very high frequency, Performance (Engineering), Feasibility studies, Goniometers, Design, Transport planes, Antennas, Flight testing, Radio transmitters, Radio equipment, Radio transmission, Operations research, Installation, Radio signals, Statistical analysis, Commercial planes.

A VORTAC installation was made on the Androscoggin, U. S. Coast Guard Cutter, to test the usefulness of this type facility as an aid to air traffic control procedures across the North Atlantic. Flight tests were conducted with the vessel located in Chesapeake Bay, east of Cape May, New Jersey; east of Jacksonville, Florida; and in mid-Atlantic at Ocean Station Charlie. Suitable modifications were made to the goniometer and the monitoring units of the VOR equipment to stabilize the VOR courses by servomechanisms controlled by the gyrocompass of the ship. The flights made while the Androscoggin was located in Chesapeake Bay and 30 miles offshore Cape May, New Jersey, were primarily to test the accuracy of the bearing information supplied by the facility. The results of these tests showed that VORTAC installations along overseas air routes would be very useful aids in the control of air traffic. (Author)

AD-427 677 Div. 33
OTS price $6.60

System Development Corp., Santa Monica, Calif.
DESCRIPTION OF THE TERMINAL AIR TRAFFIC CONTROL LABORATORY SYSTEM.
18 Sep 63, 53p. Rept. no. TM639 002 00
Unclassified report

Descriptors: (*Air traffic control systems, Model tests), (*Terminal flight facilities, Air traffic control systems), Mathematical reductions, Data processing systems, Display systems, Operations research, Test equipment, Communications systems, Cathode ray tubes, Programming (Computers), Flight paths, Decision making, Digital computers, Simulation, Test facilities.

A model of a future terminal air traffic control system was chosen as the vehicle for examining man-computer interactions which are basic to an adaptive capability. A real referent system was chosen, instead of an abstract system, so that

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OTS $0.50

UCRL-11069
Lawrence Radiation Lab., Univ. of California, Berkeley.
KINETICS OF AROMATIC NITRATION
Reid Clark Miller and Theodore Vermeulen. 15 Oct 63, 57p
Contract W7405-eng-48
OTS $1.50

UCRL-10928
Lawrence Radiation Lab., Univ. of California, Berkeley.
LONGITUDINAL DISPERSION IN PACKED EXTRACTION COLUMNS WITH AND WITHOUT PULSATION
Joon S. Moon, Alphonse Hennico, and Theodore Vermeulen. 23 Oct 63, 126p
Contract W7405-eng-48
OTS $2.50

UCRL-10757
Lawrence Radiation Lab., Univ. of California, Berkeley.
SOME PROPERTIES OF SOLID HYDROGEN AT SMALL MOLAR VOLUMES
Guenter Ahlers. Doctoral thesis. 24 Sep 63, 137p
Contract W7405-eng-48
OTS $2.50

UCRL-11081
Lawrence Radiation Lab., Univ. of California, Berkeley.
A STUDY OF THE REACTIONS BETWEEN GASEOUS AMMONIA AND SULFUR CHLORIDES
Milagros Villena-Blanco. Master's thesis. 21 Oct 63, 36p
Contract W7405-eng-48
OTS $0.75

UCRL-10857
Lawrence Radiation Lab., Univ. of California, Berkeley.
THE VAPOR PRESSURE OF INDIUM SULFIDES AS FUNCTIONS OF COMPOSITION AND TEMPERATURE
Alan R. Miller. Doctoral thesis. 21 Oct 63, 42p
Contract W7405-eng-48
OTS $1.00

UCRL-10991
Lawrence Radiation Lab., Univ. of California, Berkeley.
VAPORIZATION OF IRON OXIDES
Charles A. Washburn. Master's thesis. Aug 63, 23p
Contract W7405-eng-48
OTS $0.50

LA-2995
Los Alamos Scientific Lab., N. Mex.
THE VAPOR PRESSURE OF INDIUM
C. C. Herrick. 3 Oct 63, 31p
Contract W7405-eng-36
OTS $0.75

NBL-206
New Brunswick Lab., N. J.
BORON SCRAP RECOVERY BY PYROHYDROLYSIS
A. R. Eberle, L. J. Pinto, and M. W. Lerner. Jan 64, 10p
OTS $0.50

NBL-205
New Brunswick Lab., N. J.
INVESTIGATION OF THERMIONIC EMISSION ION SOURCES FOR THE ISOTOPIC ANALYSIS OF LITHIUM
H. O. Finley and J. J. Pucilowski, Jr. Dec 63, 13p
OTS $0.50

NBL-204
New Brunswick Lab., N. J.
SEMIANNUAL PROGRESS REPORT FOR THE PERIOD JANUARY-JUNE 1963.
C. J. Rodden
Dec 63, 77p
OTS $1.75

K-1593
Oak Ridge Gaseous Diffusion Plant, Tenn.
AN INEXPENSIVE AUTOMATIC RECORDING BALANCE
J. Farquharson. 3 Feb 64, 13p
Contract W7405-eng-26
OTS $0.50

ORNL-3390
Oak Ridge National Lab., Tenn.
THE EXPERIMENTAL DETERMINATION OF THE THERMAL CONDUCTIVITY OF MOLTEN LITHIUM FROM 600 TO 1550 DEGREES FAHRENHEIT
I. W. Cooke. Master's thesis. 1963, 160p
Contract W7405-eng-26
OTS $2.75

PWAC-426
Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
THE ENTHALPY AND HEAT CAPACITY OF URANIUM MONOCARBIDE TO 1200C. 8 Jan 64, 14p
Contract AT(30-1)2789
OTS $0.50

SCR-322
Sandia Corp., Livermore, Calif.
INFRARED SPECTROPHOTOMETRIC ANALYSIS OF URETHANE COMPOUNDS
H. L. Brumfield. Dec 63, 67p
Contract AT(29-1)789
OTS $1.50

N64-11802
Southern Research Inst., Birmingham, Ala.
A STUDY OF POLYMERS CONTAINING SILICON-NITROGEN BONDS. Progress rept. no. 33, 4 Oct 63-3 Nov 63
Robert E. Burks, Jr. and Thomas W. Ray. 15 Nov 63, 19p
Contract NAS8-1510
Rept. no. 6498-1259-33; NASA CR-52971
OTS $1.60

EARTH SCIENCES

PB-165 133
Air Force Special Weapons Center, Kirtland AFB, N. Mex.
AN EXPERIMENT ON SOILS LOADED DYNAMICALLY BY A SHOCK TUBE
Harold R. J. Walsh. Dec 60, 31p
AFSWC-TN-60-39; AD-248 576
OTS $3.60

DESCRIPTORS: *Soil mechanics, Clay, Sand, Silt, Shock tubes, *Shock waves, Propagation, Attenuation, Piezoelectric gages, Underground structures.

The Air Force 6-foot shock tube was used to pass air shocks across the upper surface of different soils samples of controlled properties. Gages of certain available types were buried within the samples or mounted upon the supports of the sample container. The tests were intended eventually to develop into an experimental study of energy transmission in soils of all types, first by investigation of the experimental difficulties apparently common to any such tests. The apparatus and procedures are described, and data from a few tests are presented. The compaction observed in the samples is described, and certain preliminary results are qualitatively discussed, including shock transmission in the sample pores, the velocities and attenuation of transmitted waves, and the extent to which differences in sample properties were reflected in the various measurements. (Author)

N64-10601
Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
ON THE DISTRIBUTION OF SURFACE HEAT FLOWS AND THE SECOND ORDER VARIATIONS IN THE EXTERNAL GRAVITATIONAL FIELD
Chi-Yuen Wang. 12 Sep 63, 16p
Grant NsG-87-60
NASA CR-52496
OTS $1.60

GPO I 19.16:386-B
Geological Survey, Washington, D. C.
DISPERSION IN GROUND WATER FLOWING THROUGH HETEROGENEOUS MATERIALS. CONTRIBUTIONS TO PROBLEMS OF RADIOACTIVE WASTE DISPOSAL
H. E. Skibitzke and G. M. Robinson. 1963, 6p
Geological Survey Professional Paper 386-B
GPO $0.20

DESCRIPTORS: *Hydrology, Fluid flow, Hydraulic models, Porous materials, Water supplies, Radioactive waste, Disposal, Tests, *Hydraulic research.

Laboratory studies of dispersion in water flowing through porous media show that the heterogeneity of the medium is the dominant dispersive factor. All other factors have insignificant effects on dispersion.

GPO I 19.3:1111-I
Geological Survey, Washington, D. C.
FROST HEAVING OF PILES WITH AN EXAMPLE FROM FAIRBANKS, ALASKA. CONTRIBUTIONS TO GENERAL GEOLOGY
Troy L. Péwé and Russell A. Paige. 1963, 81p
Geological Survey bulletin 1111-I
GPO $1.25

DESCRIPTORS: Geological survey, *Permafrost, *Alaska, *Ice, *Engineering geology, Foundations (Structures), Soil mechanics,

A review of the principles of ice growth in the ground with special reference to its effect on piles.

GPO I 19. 16:434-A
Geological Survey, Washington, D. C.
PROBABILITY DISTRIBUTION OF LOW FLOWS. STATISTICAL STUDIES IN HYDROLOGY
Nicholas C. Matalas. 1963, 31p
Geological Survey Professional Paper 434-A
GPO $0. 25

DESCRIPTORS: *Hydrology, *Rivers, *Statistical distributions, *Probability.

The fit of four theoretical probability distributions to low-flow data was investigated. Also, a study was made to determine the desirability of estimating parameters of probability distributions by the method of maximum likelihood. The four probability distributions used in these investigations were: (1) Gumbel's limited distribution of the smallest value, (2) 3-Parameter Log-Normal distribution, (3) Pearson Type III distribution, and (4) Pearson Type V distribution. The goodness of fit was based on the relation between the observed minimum low flows and the lower limits of the four probability distributions and on the relation between the skewness and kurtosis of the low-flow data. It was found that the Gumbel and Pearson Type III distributions fitted the data equally well and were more representative of the probability distribution of low flows than either the 3-Parameter Log-Normal or Pearson Type V distribution. The variances of the moment and maximum likelihood estimates of the parameters of probability distributions are functions of the skewness of the data. (Author)

GPO I 19. 16:433-A
Geological Survey, Washington, D. C.
UPTAKE AND TRANSPORT OF RADIONUCLIDES BY STREAM SEDIMENTS. TRANSPORT OF RADIONUCLIDES BY STREAMS
W. W. Sayre, H. P. Guy, and A. R. Chamberlain. 1963, 37p
Geological Survey Professional Paper 433-A
GPO $0. 30

DESCRIPTORS: *Rivers, *Radiological contamination, Hydrology, Sedimentation, Transport properties, Radioactive isotopes, Sorption, *Radioactive waste, Disposal, Radiation hazards.

The factors involved and the present status of research concerning disposal of radioactive wastes in natural streams are reviewed with respect to (1) waste characteristics, (2) dispersion theory, (3) sorption by sediments, and (4) sediment transport. Some criteria for identifying potentially hazardous streams and areas where knowledge is deficient are discussed. (Author)

N64-10298
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
AN EVALUATION OF VARIOUS GEOMAGNETIC FIELD EQUATIONS
Harold C. Euler and Peter E. Wasko. 1 Jul 63, 63p
MTP-AERO-63-60; NASA TM X-51072
OTS $6. 60

AD-283 116
Pennsylvania State Univ., University Park.
MODEL STUDIES OF SEISMIC ENERGY DISTRIBUTION AROUND DIFFERENT TYPES OF SOURCE.
Progress rept. no. 7, on Vela-Uniform
B. F. Howell, Jr., P. M. Lavin, and J. H. Pfluke.
27 Aug 62, 11p
Contract AF19(604)7383
ARPA Order no. 180-61; N62-16425
OTS $1. 60

DESCRIPTORS: *Earthquakes, *Faults (Geology), Models (Simulations), Earth models, *Seismic waves, Energy, Distribution.

Progress is reported of model studies on possible generation mechanisms which may act in natural earthquakes and the discovery of how they may be recognized by their first-motion patterns. (See also AD-279 105)

Geology

GPO I 19.13:1528
Geological Survey, Washington, D. C.
GEOLOGY AND GROUND-WATER RESOURCES OF THE SCOTTSVILLE AREA, KENTUCKY
William B. Hopkins. 1963, 336p
Geological Survey Water-Supply paper 1528
GPO $2. 75

DESCRIPTORS: *Geological survey, *Hydrology, *Kentucky, Geography, Geology, Stratigraphy, *Water supplies, Chemical properties,

The purpose of this investigation is to obtain detailed information on the occurrence, use, and quality of ground water of a small area typical of the lower formations of the Mississippian Plateau region of Kentucky. The information will be used as a basis for further ground-water studies in the Mississippian Plateau. (Author)

GPO I 19. 3:1121-F
Geological Survey, Washington, D. C.
GEOLOGY AND PETROLOGY OF TWO STOCKS OF LAYERED GABBRO IN THE FAIRWEATHER RANGE, ALASKA. CONTRIBUTIONS TO GENERAL GEOLOGY.
Darwin L. Rossman. 1963, 55p
Geological Survey bulletin 1121-F
GPO $1. 00

DESCRIPTORS: *Geological survey, Geology, *Petrology, *Alaska, Geography, Minerals.

The geology and petrology of two layered gabbro stocks and a description of included ilmenite-bearing zones.

GPO I 19. 3:1121-G
Geological Survey, Washington, D. C.
GEOLOGY OF THE AMERICAN FALLS QUADRANGLE IDAHO. CONTRIBUTIONS TO GENERAL GEOLOGY.
Wilfred J. Carr and Donald E. Trimble. 1963, 51p
Geological Survey bulletin 1121-G
GPO $1. 25

DESCRIPTORS: *Geological survey, *Idaho, *Stratigraphy, Economic geology, Petrology, Volcanoes, Geology.

Geomorphic features and the rocks of this area reveal a history of volcanic eruptions, damming of the Snake River, and flooding by overflow waters from glacial Lake Bonneville.

GPO I 19.3:1122-D
Geological Survey, Washington, D. C.
GEOLOGY OF THE ANLAUF AND DRAIN QUADRANGLES DOUGLAS AND LANE COUNTIES, OREGON. CONTRIBUTIONS TO ECONOMIC GEOLOGY.
Linn Hoover. 1963, 64p
Geological Survey bulletin 1122-D
GPO $1.00

DESCRIPTORS: *Geological survey, *Economic geology, *Oregon, *Minerals, Geography, Stratigraphy, Petrology, Structural geology,

A study of the mineral resources in Tertiary and Quaternary deposits in west-central Oregon

GPO I 19.3:1142-M
Geological Survey, Washington, D. C.
GEOLOGY OF THE BERYLLIUM DEPOSITS IN THE THOMAS RANGE, JUAB COUNTY, UTAH. CONTRIBUTIONS TO ECONOMIC GEOLOGY.
Mortimer H. Staatz. 1963, 43p
Geological Survey bulletin 1142-M
GPO $0.65

DESCRIPTORS: *Geological survey, *Utah, *Economic geology, *Beryllium, Minerals, Petrology, Geochemistry, Geology.

A study of the surface geology of the beryllium deposits, which occur in tuffs of Tertiary age.

GPO I 19.3:1063-F
Geological Survey, Washington, D. C.
GEOLOGY OF THE BURDOCK QUADRANGLE, FALL RIVER AND CUSTER COUNTIES, SOUTH DAKOTA. GEOLOGY AND URANIUM DEPOSITS OF THE SOUTHERN BLACK HILLS
Robert W. Schnabel. 1963, 31p
Geological Survey bulletin 1063-F
GPO $1.50

DESCRIPTORS: *Geological survey, *South Dakota, *Economic geology, *Uranium, Stratigraphy, Petrology, Structural geology, Geology.

The Burdock quadrangle is on the southwest flank of the Black Hills uplift in Fall River and Custer Counties, S. Dak. The quadrangle is underlain by sedimentary rocks of Jurassic, Cretaceous, and Quaternary ages. The pre-Quaternary rocks dip gently toward the southwest. Uranium deposits in the quadrangle are confined to the Fall River and Lakota formations of the Inyan Kara group of Cretaceous age and are presumed to have been deposited from ground-water solutions moving through permeable sandstones in these formations. (Author)

GPO I 19.3:1123-C
Geological Survey, Washington, D. C.
GEOLOGY OF THE DUBUQUE NORTH QUADRANGLE, IOWA-WISCONSIN-ILLINOIS. GEOLOGY OF PARTS OF THE UPPER MISSISSIPPI VALLEY ZINC-LEAD DISTRICT
Jesse W. Whitlow and C. Ervin Brown. 1963, 35p
Geological Survey bulletin 1123-C
GPO $0.45

DESCRIPTORS: *Geological survey, *Iowa, *Wisconsin, *Illinois, Stratigraphy, *Petrology, Lead, Zinc, Limestone, Structural geology, Economic geology, Geology,

Topography is generally in the early maturity stage of erosion, and maximum relief is about 390 feet. The major physiographic feature is the steep-walled valley of the Mississippi River. The next most prominent feature is Couler Valley, the abandoned channel of the Little Maquoketa River which was captured by the Mississippi River. Rocks exposed in the quadrangle are Middle and Late Ordovician in age. The St. Peter Sandstone is the oldest formation exposed in the quadrangle. The Platteville Formation conformably overlies the St. Peter Sandstone and consists of limestone, dolomite, and shale and ranges in thickness from 52 to 61 feet in this quadrangle. The Decorah Formation apparently conformably overlies the Platteville Formation. The Galena Dolomite conformably overlies the Decorah Formation. The Maquoketa Shale of Late Ordovician age seems to conformably overlie the Galena Dolomite. Zinc and lead ores mined in Iowa were in gash-vein deposits in the Galena Dolomite. Many of the relatively large pitch-and-flat zinc-ore deposits in Wisconsin and Illinois are in the Decorah Formation and the lower part of the Galena Dolomite.

GPO I 19.3:1130
Geological Survey, Washington, D. C.
GEOLOGY OF THE MOUNT PINCHOT QUADRANGLE, SOUTHERN SIERRA NEVADA, CALIFORNIA
James G. Moore. 1963, 161p
Geological Survey bulletin 1130
GPO $1.00

DESCRIPTORS: *Geological survey, *Petrology, *California, Metamorphic rock, Granite, Basalt, Rock (Geology), Structural geology, Geology, Mountains,

The Mount Pinchot quadrangle, California, includes the main crest and eastern scarp of a part of the southern Sierra Nevada and a segment of the west side of Owens Valley. The maximum relief is nearly 10,000 feet, and more than one-half of the quadrangle lies higher than 10,000 feet above sea level. The Sierra Nevada here is underlain chiefly by a mosaic of grantic intrusives of Cretaceous age which encloses small masses of pre-Cretaceous metamorphic rocks and hybrid mafic rocks. Twenty-seven separate granitic intrusive masses were mapped. Six of the intrusive masses contain porphyritic potassium feldspar. Mafic inclusions are present in most of the granitic rocks except the alaskites. Late Cenozoic basalt cinder cones and lava flows occur in the eastern part of the quadrangle at the foot of the Sierra Nevada. Olivine basalts were extruded from several of the bounding faults. Scheelite, an ore

mineral of tungsten, is present in tactite near the contact of metamorphosed limy rocks and granitic rocks. The known deposits are small. Gold-silver veins of the now idle Kearsarge district cut granodiorite and metavolcanic rocks; they are related to an alaskite pluton barely breached by erosion.

GPO I 19.3:1089-C
Geological Survey, Washington, D. C.
GEOLOGY OF THE WILLOW SPRINGS AND ROSAMOND QUADRANGLES, CALIFORNIA. GEOLOGIC INVESTIGATIONS OF SOUTHERN CALIFORNIA DESERTS.
T. W. Dibblee, Jr. 114p
Geological Survey bulletin 1089-C
GPO $1.50

DESCRIPTORS: *Geological survey, *Deserts, *California, Economic geology, Minerals, Petrology, Structural geology, Terrain, Geography.

The geology and mineral resources of an important part of the western Mojave Desert.

GPO I 19.16:423
Geological Survey, Washington, D. C.
PALEOZOIC ROCKS OF ANTELOPE VALLEY, EUREKA AND NYE COUNTIES, NEVADA.
Charles W. Merriam. 1963, 72p
Geological Survey Professional Paper 423
GPO $1.00

DESCRIPTORS: *Geological survey, *Petrology, *Stratigraphy, *Nevada, Rock (Geology), Geology.

Principles of stratigraphy applied in descriptive study of the Central Great Basin Paleozoic column.

GPO I 19.3:1142-C
Geological Survey, Washington, D. C.
THE PRECAMBRIAN IRON DEPOSITS NEAR ATLANTIC CITY, WYOMING. CONTRIBUTIONS TO ECONOMIC GEOLOGY. Preliminary rept.
Richard W. Bayley. 1963, 28p
Geological Survey bulletin 1142-C
GPO $1.25

DESCRIPTORS: *Ores (Metal sources), *Minerals, *Magnetite, *Iron, Asbestos, Gold, *Structural geology, Folds (Geology), Petrology, Metamorphic rock, *Wyoming.

The Atlantic district, in the south part of the Wind River Range, Fremont County, Wyo., includes 100 square miles of metamorphosed Precambrian sedimentary and volcanic rocks. The iron-formation is a sedimentary quartz-magnetite taconite about 150 feet thick which forms the middle part of a continuous sequence of bedded rocks. It is underlain by quartzose schist and metavolcanic rocks, and the whole sequence is disposed in the limbs of steeply pitching synclines. The magnetite content of the iron-formation is 40 to 50 percent; the grain size is small, but the material is suitable for magnetic separation after fine grinding. The total reserves are large. (Author)

GPO I 19.16:421-A
Geological Survey, Washington, D. C.
QUATERNARY GEOLOGY AND GEOMORPHIC HISTORY OF THE KASSLER QUADRANGLE, COLORADO. GEOLOGY OF THE KASSLER QUADRANGLE, JEFFERSON AND DOUGLAS COUNTIES, COLORADO
Glenn R. Scott. 1963, 75p
Geological Survey Professional Paper 421-A
GPO $1.25

DESCRIPTORS: *Geological survey, *Terrain, *Colorado, Paleontology, Geography, Soils, Structural geology, Geology,

Study of the Quaternary deposits and their fossils in relation to the geomorphology of the east flank of the Front Range, Colorado.

GPO I 19.3:1141-0
Geological Survey, Washington, D. C.
RECONNAISSANCE GEOLOGY OF NORTHERN BARANOF ISLAND, ALASKA. CONTRIBUTIONS TO GENERAL GEOLOGY.
H. C. Berg and D. W. Hinckley. 1963, 28p
Geological Survey bulletin 1141-0
GPO $0.70

DESCRIPTORS: *Geological survey, Mapping, *Alaska, *Petrology, Stratigraphy, Structural geology, Geology.

A stratigraphic and structural study to provide a basis for geologic mapping of Baranof and southern Chichagof Islands.

GPO I 19.13:1539-Q
Geological Survey, Washington, D. C.
RECONNAISSANCE OF THE HYDROLOGY OF THE LITTLE LOST RIVER BASIN, IDAHO. CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES
M. J. Mundorff, H. C. Broom, and Chabot Kilburn. 57p
Geological Survey Water-Supply paper 1539-Q
GPO $0.75

DESCRIPTORS: *Geological survey, *Hydrology, *Idaho, Geology, *Water supplies, Rivers, Volume, Measurement,

The Little Lost River basin is one of several basins along the northwest flank of theSnake River Plain that has no surface outlet to the Snake River. The economy of the area depends almost entirely upon agriculture; and, because annual precipitation on the valley floor averages only about 10 inches, irrigation is required for production of cultivated crops. Prior to 1954 cultivated land was irrigated almost entirely with surface water. Substantial ground-water pumping began about 1954, and in 1959 about 37,000 acre-feet of water was pumped from 63 wells to furnish about 40 percent of the total water supply for the 16,000 acres under cultivation. The discharges of most tributary streams were measured in September 1959, and were used to estimate the annual contribution to the river from the mountainous perimeter. Discharge measurements were made also at several places along the Little Lost River for determination of channel gains

and losses. An inventory was made of all irrigation wells in the area, and the data collected were used in preparing a water-table map, a hydrologic profile, well sections showing lithology, and an inventory of ground-water pumpage. (Author)

Physics of the Atmosphere

GPO C 13.46:171
American Meteorological Society, Washington, D. C.
BIBLIOGRAPHY ON ATMOSPHERIC ASPECTS OF RADIO ASTRONOMY: INCLUDING SELECTED REFERENCES TO RELATED FIELDS
Wilhelm Nupen. 1 May 63, 451p
NBS Technical note 171 ; N64-12165
GPO $2.00

DESCRIPTORS: *Bibliographies, *Radio astronomy, *Atmosphere, Radiofrequency interference, *Extraterrestrial radio waves, Solar radiation, Atmospherics, Abstracts.

The present compilation contains over a thousand abstracts or titles from the literature published between 1900 and 1961. The subject matter in this bibliography is confined to the effects of the Earth's atmosphere on radiofrequency radiation from the sun, planets, stars, the galaxies and intergalactic space, or knowledge of atmospheric or ionospheric structure, composition, or physics. A small amount of material is included on propagation of radio waves in or from atmospheres of other planets, or reflections from these planets. Other borderline aspects of the broad field are also touched on but not treated exhaustively since the main emphasis is on the various influences exerted by the Earth's atmosphere on terrestrial or extra-terrestrial radiofrequency radiation. (Author)

N64-11333
Geophysics Corp. of America, Bedford, Mass.
STUDIES OF REVISED AND SUPPLEMENTARY ATMOSPHERES AND STRUCTURES AND VARIABILITY OF THE EARTH'S ATMOSPHERE. Final rept.
Jun 63, 102p
Contracts NASw-394 and AF19(628)1633
GCA Technical rept. no. 63-18-N; NASA CR-52868
OTS $9.10

N64-10178
Iowa State U., Iowa City.
THE MORPHOLOGY OF THE ELECTRON DISTRIBUTION IN THE OUTER RADIATION ZONE AND NEAR THE MAGNETOSPHERIC BOUNDARY AS OBSERVED BY EXPLORER XII
John Wright Freeman, Jr. Jun 63, 123p
Grant NsG-233-62
SUI-63-20; NASA CR-52300
OTS $10.10

ENGINEERING

N64-10340
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
AN ATMOSPHERE ENTRY SIMULATOR
Carlton Bioletti. [1959] 19p Presented at the 27th Shock and Vibration Symp., Fort Bliss, El Paso, Tex., Feb 25-27, 1959
Technical memo. X-51119
OTS $1.60

NASA-SP-5001
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
AN IMPROVED PRECISION HEIGHT GAGE
Lester B. Vale. Nov 63, 13p
N64-14062
OTS $0.50

UCRL-7473
Lawrence Radiation Lab., Univ. of California, Livermore.
DEFLECTIONS AND STRESSES IN HEMISPHERICAL LIGHTWEIGHT CELLULAR SUPPORT STRUCTURE WITH FLEXIBLE SUPPORTING SHELL
J. Penzien and G. L. Sheldon. Sep 63, 61p
Contract W7405-eng-48
OTS $1.50

N64-11340
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
VACUUM COMPATIBILITY OF ENGINEERING MATERIALS (SOLIDS)
J. B. Gayle, S. V. Caruso, and C. T. Egger. 16 Sep 63, 85p
MTP-P&VE-M-63-11; NASA TM-X-51166
OTS $8.10

N64-10309
Northrop Space Labs., Hawthorne, Calif.
CONCEPTUAL INVESTIGATIONS OF VARIABLE GEOMETRY SPACE STRUCTURES. Final rept.
M. Lebovits, H. L. Sujata, C. F. King, and J. W. Young. May 63, 178p
Contract NASr-114
NSL-63-115; NASA CR-52464
OTS $12.50

SC-4960(RR)
Sandia Corp., Albuquerque, N. Mex.
THE HYPERSONIC PLASMA CONVERTER: I
K. J. Touryan. Jan 64, 36p
Contract [AT(29-1)789]
OTS $0.75

Aeronautical Engineering

N62-71025
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FLUTTER RESEARCH ON SKIN PANELS
Eldon E. Kordes, Weimer J. Tuovila, and Lawrence D. Guy. Sep 60, 18p
NASA TN D-451; AD-241 930
OTS $1.60

N63-20524
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
DESIGN ANALYSIS OF A SUBSONIC NUCLEAR-POWERED LOGISTIC AIRPLANE WITH HELIUM-COOLED REACTOR
R. H. Cavicchi, H. H. Ellerbrock, E. W. Hall, H. J. Heppler, J. N. B. Livingood, and F. C. Schwenk. 23 Oct 59, declassified 24 Jan 63. 250p
NASA TM X-28
OTS $16.00

Chemical Engineering

ANL-6763
Argonne National Lab., Ill.
LABORATORY INVESTIGATIONS IN SUPPORT OF FLUID RED FLUORIDE VOLATILITY PROCESSES: PART IV. THE FLUID BED FLUORINATION OF U_3O_8
R. L. Jarry, A. V. Hariharan, G. Manevy, J. Fischer, and J. J. Stockbar. Oct 63, 24p
Contract W31-109-eng-38
OTS $0.50

ORNL-3501
Oak Ridge National Lab., Tenn.
FUEL CYCLE COSTS FOR A PLUTONIUM RECYCLE SYSTEM
F. E. Harrington, E. D. Arnold, D. C. Brater, D. A. Douglas, and S. H. Smiley. 1963, 36p
Contract W7405-eng-26
OTS $1.00

IDO-14619
Phillips Petroleum Co., Idaho Falls.
AN IMPROVED AQUEOUS PROCESS FOR ZIRCONIUM ALLOY NUCLEAR REACTOR FUELS. PART II. CONTINUOUS DISSOLUTION WITH 5M HYDROFLUORIC ACID
B. J. Newby. 25 Sep 63, 19p
Contract AT(10-1)205
OTS $0.50

DP-847
Savannah River Lab., Aiken, S. C.
HEAT AND MASS TRANSFER IN A TURBINE CONTACTOR
Donald S. Webster, Dec 63, 35p
Contract AT(07-2)1
OTS $0.75

Electrical and Electronic Engineering

N64-10085
Allison Div., General Motors Corp., Indianapolis, Ind.
DEVELOPMENT AND TEST OF ELECTROLYTE MATRIX COMBINATIONS FOR MERCURY-POTASSIUM FUEL CELL. Quarterly technical progress rept. no. 3, 12 Jun-12 Sep 63
T. F. Nagey. 10 Oct 63, 17p
Contract NASw-476
Rept. no. EDR-3609; NASA CR-52141
OTS $1.60

AD-275 254
Allison Div., General Motors Corp., Indianapolis, Ind.
INVESTIGATION OF A 3 KW STIRLING CYCLE SOLAR POWER SYSTEM. VOLUME I: ENGINE DESIGN. Final rept. Sep 59-Jun 60, on Energy Conversion Technology
M. D. Parker and M. J. Malik. Feb 62, 66p
Contract AF33(616)6771
Engineering Dept. rept. no. 1767, WADD-TR-61-122, Volume I
OTS $6.60

DESCRIPTORS: *External combustion engines, *Auxiliary power plants, *Power supplies, *Energy conversion, Solar radiation, *Electric power production, *Engine structures, Design, Operation, Thermodynamics, Spacecraft, Satellites (Artificial), Analysis,

The thermodynamic and the mechanical design of an advanced type Stirling cycle engine for application to a solar energized space power system is described in this report. The basic Stirling cycle is reviewed with respect to the effects of various thermodynamic parameters on engine output and efficiency. Several engine subassembly designs are considered and the merits of each mechanical arrangement are compared. The problems associated with sealing the working fluid for extended periods of time, metal transport in the NaK heat circuit, and drive mechanism lubrication in a zero gravity environment are discussed. The operation of the motor-generator units incorporated in the engine and a simplified control system are outlined. Finally the engine mechanical design layout, the detail design specifications, and a weight summary of the major engine components are presented. Several areas in which further research and development should be concentrated are indicated. (Author)

AD-275 031
Allison Div., General Motors Corp., Indianapolis, Ind.
INVESTIGATION OF A 3 KW STIRLING CYCLE SOLAR POWER SYSTEM. VOLUME II: SYSTEM EVALUATION. Fianl rept. Sep 59-Aug 60, on Energy Conversion Technology
E. A. Poste and R. O. Whitaker. Mar 62, 144p
Contract AF33(616)6771
[Engineering Dept. rept. no. 1767] WADD-TR-61-122, Volume II; N62-11824
OTS $11.00

DESCRIPTORS: *External combustion engines, *Solar radiation, *Energy conversion, *Electric power production, *Auxiliary power plants, *Power supplies, Spacecraft, Satellites (Artificial), Space flight, Stresses, Design, Operation, Reliability (Electronics), Effectiveness,

This report presents the results of the analysis of a solar energized space power system using a Stirling engine as the thermomechanical energy converter. Future space programs and their power requirements are reviewed to show areas in which a Stirling engine system is most suitable. The manner in which the mission, vehicle, and power requirements influence the selection of all components of the system is discussed. A comparison is made between the Stirling engine system and a comparable mercury Rankine system, showing that use of the Stirling system results in a considerable reduction in wieght for all practical missions with a power requirement of one to thirty kw. A detailed design study of the application of the Stirling engine to a typical mission with a three kw power requirement is presented. (Author) (See also AD-275 254)

AD-402 479
Allison Div., General Motors Corp., Indianapolis, Ind.
INVESTIGATION OF A 3 KW STIRLING CYCLE SOLAR POWER SYSTEM. VOLUME IV: SOLAR COLLECTOR ANALYSIS AND EXPERIMENTAL RESEARCH, APPENDIXES. Final rept. for Sep 59-Aug 60, on Energy Conversion Technology
D. L. Dresser, E. H. Hietbrink, R. B. McClure, and R. O. Whitaker. Feb 63, 176p
Contract AF33(616)6771
Engineering Dept. rept. no. 1767; WADD-TR-61-122, Volume IV
OTS $12.50

DESCRIPTORS: *External combustion engines, *Auxiliary power plants, *Power supplies, *Energy conversion, Solar radiation, *Optics, *Mirrors, Reflectors, Spacecraft, Satellites (Artificial), Analysis, Data, *Electric power production

This volume contains the appendixes relating to the material in Volume III. A theoretical analysis of the optics of Fresnel mirrors and methods of calculating and measuring experimentally the intensity distribution of mirrors are included. The temperature of mirror foils as a function of orbital position for a close-in earth satellite, and the thermal distortion of Fresnel mirrors are also discussed. (Author) (See also AD-275 031)

AD-275 032
Allison Div., General Motors Corp., Indianapolis, Ind.
INVESTIGATION OF A 3 KW STIRLING CYCLE SOLAR POWER SYSTEM. VOLUME V: SOLAR ENERGY ABSORBER ANALYSIS AND EXPERIMENTAL RESEARCH. Final rept. Sep 59-Aug 60, on Energy Conversion Technology
Y. S. Tang and C. L. Walker. Feb 62, 38p
Contract AF33(616)6771
Engineering Dept. rept. no. 1767; WADD-TR-61-122, Volume V; N62-11825
OTS $3.60

DESCRIPTORS: *External combustion engines, *Auxiliary power plants, *Power supplies, *Energy conversion, *Electric power production, *Solar radiation, *Absorption, Configuration, Spacecraft, Satellites (Artificial), Effectiveness, Analysis,

Requirements of an optimum solar absorber for Stirling engine solar power systems are discussed. The determination of selective absorptivity and cavity-type absorber efficiency is given for establishing the basis of configuration selection. Theoretical absorber contour with uniform flux intensity was determined using classical configuration-factor expression with the aid of digital computation. An experimental method for evaluation of absorber contour is shown. (Author) (See also AD-402 479)

AD-275 033
Allison Div., General Motors Corp., Indianapolis, Ind.
INVESTIVATION OF A 3 KW STIRLING CYCLE SOLAR POWER SYSTEM. VOLUME VI: ENERGY STORAGE SYSTEM ANALYSIS AND EXPERIMENTAL RESEARCH. Final rept. Sep 59-Aug 60, on Energy Conversion Technology
Y. S. Tang, R. S. Richardson, and J. P. Ellis. Feb 62, 72p
Contract AF33(616)6771
Engineering Dept. rept. no. 1767; WADD-TR-61-122, Volume VI; N62-11826
OTS $7.60

DESCRIPTORS: *External combustion engines, *Auxiliary power plants, *Power supplies, *Energy conversion, Solar radiation, *Electric power production, *Thermal radiation, *Storage, Lithium compounds, Hydrides, Containers, Spacecraft, Satellites (Artificial), Analysis

A thermal storage unit was chosen as a result of extensive investigation on various energy storage methods. Lithium hydride (LiH) was selected as a storage material due to its favorable properties. Experiments were performed in handling and containment of lithium hydride. Satisfactory capsules were fabricated and tested in furnace and liquid metal loop experiments. Design considerations are also given. (Author) (See also AD-275 032)

AD-275 034
Allison Div., General Motors Corp., Indianapolis, Ind.
INVESTIGATION OF A 3 KW STIRLING CYCLE SOLAR POWER SYSTEM. VOLUME VII: SPACE RADIATOR SYSTEM ANALYSIS AND EXPERIMENTAL RESEARCH. Final rept. Sep 59-Aug 60, on Energy Conversion Technology
C. R. Smith, D. G. Gritton, and C. L. Walker. Mar 62, 131p
Contract AF33(616)6771
Engineering Dept. rept. no. 1767; WADD-TR-61-122, Volume VII; N62-11827
OTS $10.50

DESCRIPTORS: *External combustion engines, *Auxiliary power plants, *Power supplies, *Energy conversion, Solar radiation, *Electric power production, *Radiators, Fins, Pipes, *Heat transfer, Cooling, Spacecraft, Meteorites, Satellites (Artificial), Analysis,

Weight optimization is reported for fin-and-tube type thermal radiators designed for space satellite applications. A description of the method used in making the optimization calculation is presented with weight-optimized design data for the fin-and-tube type radiator. Meteorite puncture probability considerations are included which dictate tube and header design. Correlations for various parameters are presented based on calculations for heat loads of 10^4 to 10^6 Btu/hr and average coolant temperatures from 500 to 1000°R. An exponential expression for the total weight in terms of heat load and coolant temperature is suggested. A full-scale section of a radiator designed on the basis of the analysis above has been fabricated and tested in simulated space environment. Results of these tests, and comparison between experimental and predicted analytical data are reported. Also included is an appendix which analyzes the problem of meteoric damage to space heat exchangers with particular reference to shielding. (Author) (See also AD-275 033)

AD-275 035
Allison Div., General Motors Corp., Indianapolis, Ind.
INVESTIGATION OF A 3 KW STIRLING CYCLE SOLAR POWER SYSTEM. VOLUME VIII: ORIENTATION SYSTEM ANALYSIS. Final rept. Sep 59-May 60, on Energy Conversion Technology
R. O. Whitaker. Feb 62, 112p
Contract AF33(616)6771
Engineering Dept. rept. no. 1767; WADD-TR-61-122, Volume VIII; N62-11828
OTS $9.60

DESCRIPTORS: *External combustion engines, *Auxiliary power plants, *Power supplies, *Energy conversion, Solar radiation, *Electric power production, *Satellite attitude, Trajectories, *Positioning devices (Machinery), *Control systems, Spacecraft, Satellites (Artificial), Analysis

This report summarizes work done at the Allison Division during the past year in the field of solar power system orientation. Various space vehicle missions and the features thereof which affect the problem of orienting the power converter are discussed. Sources of disturbance to the converter are enumerated and the means of reducing their effects are outlined. A detailed discussion of a favorably considered orientation control, which "pushes against" the parent vehicle, is presented Principles underlying an attitude control, for power converters which do not have a controlled vehicle against which to "push", are presented. Several fields in which research and development should be concentrated are indicated. (Author) (See also AD-275 034)

AD-275 036
Allison Div., General Motors Corp., Indianapolis, Ind.
INVESTIGATION OF A 3 KW STIRLING CYCLE SOLAR POWER SYSTEM. VOLUME IX. POWER SYSTEM CONTROL ANALYSIS. Final rept. Sep 59-Aug 60, on Energy Conversion Technology
W. E. Cuttill, M. J. Malik, and V. L. Decker. Mar 62, 59p
Contract AF 33(616)6771
Engineering Dept. rept. no. 1767; WADD-TR-61-122, Volume IX; N62-11829
OTS $5.60

DESCRIPTORS: *External combustion engines, *Auxiliary power plants, *Power supplies, *Energy conversion, Solar radiation, *Electric power production, *Control systems, Servomechanisms, *Analog systems, Thermodynamics, Spacecraft, Satellites (Artificial), Analysis,

This report summarizes work done in the field of Stirling engine power system control for space applications. Various mechanical and electrical control modes are considered and their performance compared. An analog dynamic simulation program is presented that can be used for control mode evaluations. Preliminary results are presented which are typical of the input data, but not necessarily representative of a particular design. Future studies and utilization of the analog program are indicated. (Author) (See also AD-275 035)

AD-276 975
Allison Div., General Motors Corp., Indianapolis, Ind.
INVESTIGATION OF A 3 KW STIRLING CYCLE SOLAR POWER SYSTEM. VOLUME X: STIRLING ENGINE EXPERIMENTAL EVALUATION. Final rept. 1 Sep-31 Dec 60, on Energy Conversion Technology
M. D. Parker, M. L. Malik, R. B. Wright, J. F. Staley, and J. D. Mangus. Feb 62, 103p
Contract AF33(616)6771
[Engineering Dept. rept. no. 1767]
WADD-TR-61-122, Volume X; N62-13271
OTS $9.10

DESCRIPTORS: *External combustion engines, *Auxiliary power plants, *Power supplies, *Energy conversion, Solar radiation, *Electric power production, Test facilities, Lubrication, Seals (Stoppers), Design, Operation, Feasibility studies.

This report presents the results of four basic tasks which were conducted in a program to determine the feasibility of a solar-energized 3-kw Stirling engine for space power: Performance Evaluation - The results of tests which were conducted on a research engine to obtain performance data and operational experience are reported. Also included is a description of the test facilities utilized in this task. Preliminary Flight-weight Engine Design - A description of a 3-kw Stirling engine which incorporates features required for space use is presented. The principal aims of this task were weight reduction and the design of a zero-g lubrication system. Modifications resulting from test results were also included in the flightweight engine design. Seal Evaluation Tests - A description of a power piston and shaft seal test rig and the results of seal tests are presented. Such tests were deemed necessary to provide a long-life dry reciprocating seal of high integrity. Zero-g Lubrication Test Rig - A discussion of a zero-g lubrication system and a description of a test rig which is to be fabricated for use in the ASD Weightless Test Facility (modified KC-135) are presented. (Author) See also AD-275 036)

N64-12152
Borden Chemical Co., Philadelphia, Pa.
RESEARCH AND DEVELOPMENT OF SEPARATORS FOR SILVER OXIDE-ZINC AND SILVER OXIDE-CADMIUM CELLS FOR SPACECRAFT APPLICATION
Quarterly rept. no. 1, 27 Jun-27 Sep 63
H. E. Hoyt and H. L. Pfluger. 15 Nov 63, 26p
Contract NAS5-3467
NASA CR-52475 OTS $2.60

PB-181 637
Bureau of Naval Weapons, Washington, D. C.
AC-DC INSTRUMENT CALIBRATION STANDARD, RADIO FREQUENCY LABORATORIES 829. Technical manual, BuWeps-BuShips Calibration Program.
1 Aug 63, 43p
Instrument Calibration Procedure AQ-06
OTS $1.25

DESCRIPTORS: *Test equipment (Electronics), *Standards, Alternating current, Direct current, Calibration, Instruction manuals

The resistance decades and ratio dial of the Test Instrument are calibrated by using a Wheatstone bridge to measure the accumulated resistance value for each position of the ratio dial. The direct-voltage meter and range multipliers are calibrated by using a precision potentiometer and volt box. The direct-current range multipliers are calibrated by using a precision potentiometer and shunts to perform a full-scale measurement for each current range. The alternating-voltage meter and range multipliers are calibrated by using a precision potentiometer and a transfer standard. The alternating-current range multipliers are calibrated by using a precision potentiometer and a transfer standard to perform a full-scale measurement for each current range.

PB-181 636
Bureau of Naval Weapons, Washington, D. C.
AC-DC STANDARD VOLT-AMP-MILLIAMMETER, SENSITIVE RESEARCH MODEL THACH. Technical manual, BuWeps-BuShips Calibration Program.
1 Aug 63, 18p
Instrument Calibration Procedure AQ-05
OTS $0.50

DESCRIPTORS: *Multimeters, *Voltmeters, *Ammeters, *Standards, Alternating current, Direct current, Calibration, Instruction manuals, Test equipment (Electronics)

The safety circuit is tested by applying a full-scale voltage with the safety circuit locked out, and noting the corresponding deflection with the safety circuit switched in. The accuracy of the self-check system is tested by adjusting the meter to full scale using the self-check circuit, and then measuring the input current required to obtain the same full-scale indication on the Test Instrument. An ac-dc-transfer test is performed for each thermocouple at full-scale and half-scale points. At each point, the values and difference between the values of the d-c input currents of opposite polarity required to obtain the desired Test Instrument indication are determined. Linearity tests are performed on the current ranges. The input currents required to obtain the desired indications are measured by the IR drop method. The voltage ranges are tested at full scale. The potentiometer is used directly on the low ranges, and with a volt box on the high ranges, to measure the input voltage required to obtain the selected Test Instrument indication.

PB-181 635
Bureau of Naval Weapons, Washington, D. C.
AC-DC VOLT-AMMETER, SENSITIVE RESEARCH U-88 AND UX POLYRANGERS. Technical manual, BuWeps-BuShips Calibration Program. 15 Aug 63, 26p
Instrument Calibration Procedure AQ-04
OTS $0.75

DESCRIPTORS: *Multimeters, *Ammeters, *Voltmeters, Alternating current, Direct current, Calibration, Instruction manuals, Test equipment (Electronics)

The low direct voltage ranges are calibrated by measuring the input voltages required to obtain the selected Test Instrument indications. In the high direct voltage ranges, the input voltage is determined from the control settings on the voltage source. The direct current ranges are tested by measuring the IR drop across resistor in series with the current source. The thermocouple a-c to d-c transfer function is tested at full-scale and half-scale points on the 1.0 volt a-c range using the reverse d-c method. In this method a d-c voltage is applied to the Test Instrument, when the polarity is reversed and the difference in the two readings is considered to be the a-c to d-c transfer error. The alternating voltage and current ranges are tested at full scale using direct input voltages and currents as in the d-c calibration.

PB-181 618
Bureau of Naval Weapons, Washington, D. C.
AC-DC VOLTAGE INSTRUMENTS 10 TO 1000 VOLTS FULL SCALE (DYNAMOMETER VOLTMETERS). Technical manual, BuWeps-BuShips Calibration Program. 1 Jun 63, 15p
OTS $0.50

DESCRIPTORS: Instruction manuals, *Dynamometers, *Voltmeters, Calibration, Test equipment (Electronics).

A linearity test is performed initally by using the reverse d-c method. The direct input voltage required to produce the desired "dynamometer voltmeter" indication is measured with a precision potentiometer. A second measurement is made with the polarity of the input voltage reversed. The "dynamometer voltmeter" nominal value is then compared to the average of the measured values. An a-c - d-c difference test is performed at the full-scale and half-scale points used in the linearity test. An alternating voltage at 50 cps (or at the frequency specified for the instrument), is applied and adjusted to obtain the selected indication on the "dynamometer voltmeter". The alternating input voltage is then measured. A frequency response test is performed at three frequencies in the range of the "dynamometer voltmeter", using the method employed in the a-c - d-c difference test.

PB-181 633
Bureau of Naval Weapons, Washington, D. C.
ADJUSTABLE FILTER, GENERAL RADIO 1231-P5M. Technical manual, BuWeps-BuShips Calibration Program.
1 Jun 63, 12p
Instrument Calibration Procedure AN-02
OTS $0.50

DESCRIPTORS: *Radiofrequency filters, Calibration, Instruction manuals, Test equipment (Electronics)

The accuracy and rejection tests are performed by applying a signal from an oscillator at the correct resonant frequency to the Test Instrument input, establishing a reference indication on an EVM, adjusting the oscillator frequency to twice the resonant frequency, and measuring the harmonic and noise rejection on an EVM. This test is repeated for each fixed frequency.

PB-181 615
Bureau of Naval Weapons, Washington, D. C.
AMPLIFIERS KIN TEL 111B AND 111BF.
Technical manual, BuWeps-BuShips Calibration Program. 9 Jul 59, changed 1 Aug 62, 8p
Instrument Calibration Precedure AA-09, change notice
OTS $0.50

DESCRIPTORS: *Amplifiers, Calibration, Instrumentation, Instruction manuals, Electronic equipment.

PB-181 625
Bureau of Naval Weapons, Washington, D. C. –
BRIDGE OSCILLATOR GENERAL RADIO 1330-A.
Technical manual, BuWeps-BuShips Calibration Program. 15 Jun 63, 15p
Instrument Calibration Procedure AG-30
OTS $0.50

DESCRIPTORS: Instruction manuals, *Microwave bridges, *Oscillators, Calibration, Test equipment (Electronics), Tests.

The Test Instrument is a general purpose oscillator producing three fixed audio frequencies, and variable frequencies from 5 kc to 50 Mc. Two of the three audio frequencies, 400 cps and 1000 cps, may be used to modulate the RF singnal. The third audio frequency is the power line frequency. Frequency measurements are made with an electronic counter. The amplitude of the signal at the RF output connection is measured with an EVM. Distortion in the output at frequencies of 5 kc and 15 kc is measured with a distortion analyzer. Amplitude modulation tests are made using an oscilloscope to display and measure, by comparison, the relative amplitude of an unmodulated versus a modulated RF signal. The amplitude of the unmodulated output is adjusted to a 4 cm vertical deflection. The modulation is then applied to the RF signal, and the percentage of modulation is computed using the maximum and minimum vertical deflection values in a formula.

PB-181 653
Bureau of Naval Weapons, Washington, D. C.
CAPACITANCE-INDUCTANCE-RESISTANCE BRIDGE ZM-11/U, ZM-11A/U. Technical manual, BuWeps-BuShips Calibration Program. 15 Jun 63, 16p
Instrument Calibration Procedure AZ-10
OTS $0.50

DESCRIPTORS: Instruction manuals, *Capacitance bridges, Inductance, Calibration, Test equipment (Electronics), Resistors,

A power supply and a milliammeter are used to verify the accuracy of the panel meter ranges. An electronic counter is used to measure the frequency of the internal generator. A decade resistor is used to verify the linearity of the multiply range setting by dial, and the function selector switch positions. A standard capacitor is used to verify the accuracy of the internal capacitance standards. A decade resistor and a standard capacitor are used to verify the dissipation factor accuracy. An inductor (autotransformer) and a decade resistor are used to verify the storage factor indication of the Q dial.

PB-181 655
Bureau of Naval Weapons, Washington, D. C.
CAVITY FREQUENCY METERS 2.60 THROUGH 26.50 GC (KMC). Technical manual, BuWeps-BuShips Calibration Program. 15 Jun 63, 32p
Instrument Calibration Procedure GF-04
OTS $1.00

DESCRIPTORS: Instruction manuals, *Frequency meters, Calibration, Test equipment (Electronics).

This procedure describes the calibration of waveguide-type cavity frequency meters in the frequency range of 2.60 to 26.50 Gc. Instructions are given for the calibration of meters in frequency ranges of 2.60 to 12.40 Gc, 12.40 to 18.00 Gc, and 18.00 to 26.50 Gc.

PB-181 658
Bureau of Naval Weapons, Washington, D. C.
COAXIAL LOW-PASS FILTERS, MICROLAB LA (FL) SERIES. Technical manual, BuWeps-BuShips Calibration Program. 1 Aug 63, 37p
Instrument Calibration Procedure GN-07
OTS $1.00

DESCRIPTORS: Instruction manuals, *Coaxial filters, *Low-pass filters, Calibration, Test equipment (Electronics)

This procedure describes the measurement of the insertion loss, frequency rejection, and VSWR of the Microlab low-pass filters.

PB-181 611
Bureau of Naval Weapons, Washington, D. C.
COMPARISON BRIDGE ELECTRO-MEASUREMENTS 260, Technical manual, BuWeps-BuShips Calibration Program. 1 Jul 63, 14p
Instrument Calibration Procedure AZ-04
OTS $0.50

DESCRIPTORS: Instruction manuals, Test equipment (Electronics), Calibration, Oscillators, Frequency multipliers, Phase meters, *Impedance bridges,

The frequency of the internal oscillator unit is measured with the electronic counter. The magnitude and phase multipliers are calibrated with the resistor decades. The magnitude dial is calibrated by using the resistor decades for the calibration of the multipliers. The phase dial is calibrated by using dissipation factors of known values.

PB-181 631
Bureau of Naval Weapons, Washington, D. C.
DC POWER SUPPLY, FLUKE 301C. Technical manual, BuWeps-BuShips Calibration Program. 1 Jul 63, 13p
Instrument Calibration Procedure AH-02
OTS $0.50

DESCRIPTORS: *Power supplies, Direct current, Calibration, Instruction manuals, Test equipment (Electronics)

Ripple voltage is measured on the 1000-volt setting with an EVM. An external blocking capacitor is used to provide adequate high-voltage protection. The regulation test includes a line regulation test and a load regulation test. The line regulation test is performed by measuring and the output voltage with a potentiometer at line voltages of 105 and 125 volts. The load regulation test is performed by measuring the output voltage under full load with a potentiometer. The accuracy of the current meter is verified when performing the regulation tests.

PB-181 639
Bureau of Naval Weapons, Washington, D. C.
DC VACUUM TUBE VOLTMETER, HEWLETT PACKARD 412A. Technical manual, BuWeps-BuShips Calibration Program. 1 Apr 63, 18p
Instrument Calibration Procedure AQ-19
OTS $0.50

DESCRIPTORS: *Multimeters, *Voltmeters, *Ohmmeters, *Ammeters, Direct current, Calibration, Instruction manuals, Test equipment (Electronics).

This procedure describes the calibration of the HP 412A dc voltmeter-ohmmeter-milliammeter, which measures full-scale voltages from 1 mv to 1000v, full-scale currents from 1 μa to 1a, and center-scale resistances from 1 ohm to 100 megohms.

PB-181 606
Bureau of Naval Weapons, Washington, D. C.
DECADE CAPACITOR, CORNELL-DUBILIER CDA-5. Technical manual, BuWeps-BuShips Calibration Program. 1 Jun 63, 9p
Instrument Calibration Procedure AC-02
OTS $0.50

DESCRIPTORS: Instruction manuals, *Capacitors, Calibration, Capacitance bridges, Measurement,

This procedure describes the calibration of the Cornell-Dubilier CDA-5 decade capacitor which is calibrated by measuring the capacitance for each step of each decade with a capacitance bridge.

PB-181 626
Bureau of Naval Weapons, Washington, D. C.
DIAL TYPE OSCILLATORS (0.001 CPS TO 1 MC). Technical manual, BuWeps-BuShips Calibration Program. 15 Jul 63, 22p
Instrument Calibration Procedure AG-34, supersedes rept. dated 25 Mar 60
OTS $0.75

DESCRIPTORS: Instruction manuals, *Electronic equipment, *Oscillators, *Microwave oscillators, Calibration, Test equipment (Electronics), Tests.

PB-181 617
Bureau of Naval Weapons, Washington, D. C.
DIFFERENTIAL PREAMPLIFIER TEKTRONIX 53/54G AND G. Technical manual, BuWeps-BuShips Calibration Program. 1 Jun 63, 20p
Instrument Calibration Procedure AA-19
OTS $0.50

DESCRIPTORS: Instruction manuals, *Preamplifiers, Amplifiers, Calibration, Test equipment (Electronics).

The Test Instrument is a differential wide-band preamplifier used with Tektronix 530, 540, and 550 series oscilloscopes. A selector switch provides for use of either input separately, or both together differentially, either ac- or dc-coupled. Each input has a calibrated step attenuator. A variable attenuator and a vertical positioning control are common to both inputs. Internal adjustments are provided for input capacitance, frequency compensation, balance and gain.

PB-181 643
Bureau of Naval Weapons, Washington, D. C.
DISTORTION ANALYZERS, HEWLETT PACKARD 330B OR HO1-330D (FORMERLY DESIGNATED HP SPECIFICATION 75339). Technical manual, BuWeps-BuShips Calibration Program. 1 Jul 63, 32p
Instrument Calibration Procedure AW-12
OTS $1.00

DESCRIPTORS: *Interference analyzers, Calibration, Instruction manuals, Test equipment.

The Test Instrument consists of an amplifier, a variable frequency rejection filter, an EVM, and a power supply. It measures distortion by rejection of the fundamental signal. The input signal voltage is amplified and measured with the internal EVM to establish a reference level. The fundamental frequency of the signal is then rejected, and that which remains (hum, noise, and harmonic distortion) is indicated by the internal EVM as the percentage of distortion.

PB-181 649
Bureau of Naval Weapons, Washington, D. C.
ELECTRON TUBE SET TV-10A/U. Technical manual, BuWeps-BuShips Calibration Program. 15 Mar 63, 14p
Instrument Calibration Procedure AY-05
OTS $0.50

DESCRIPTORS: Instruction manuals, *Test sets, *Electron tubes, Calibration, Test equipment (Electronics),

The shorts test is performed by simulating high resistance shorted tube elements, and verifying that the proper short indications are obtained. The simulated shorts are connected to the various pin jacks in the NOVAL tube socket. The "line test" voltage, selected filament voltages, and each of the integral power supply voltages are measured at the OCTAL tube socket with an EVM or a 1000Ω/VOLT voltmeter. The Test Instrument transconductance function is tested by simulating a tube of known resistance. A plate balance test is performed prior to the micromhos test to ensure equipotential conditions of the micromhos test network. The filament supply of the Test Instrument is used to simulate the grid signal while an external decade resistor simulates the plate resistance.

PB-181 650
Bureau of Naval Weapons, Washington, D. C.
ELECTRON TUBE TEST SET TV-7/U, TV-7A/U, TV7B/U, TV-7D/U. Technical manual, BuWeps-BuShips Calibration Program. 15 Jun 63, 19p
Instrument Calibration Procedure AY-11
OTS $0.50

DESCRIPTORS: Instruction manuals, *Test sets, *Electron tubes, Calibration, Test equipment (Electronics),

A line voltage test is performed to verify the correct indication of the panel meter with respect to the plate voltage and the 117-volt filament voltage. The filament voltages are tested for continuity and the values at selected switch settings are recorded. These measurements are made with an EVM. The shorts test is performed by simulating high resistance shorted tube elements, and verifying that the proper short indications are obtained. The shorts are connected to the various pin jacks in the NOVAL tube socket. The screen, low screen, and bias voltages are measured at the OCTAL tube socket with a 1000Ω/volt voltmeter. The gas circuit values are measured with an EVM and an ohmmeter. The Test Instrument transconductance function is tested by simulating a tube of known resistance. A plate balance test is performed prior to the micromhos test to ensure equipotential conditions of the micromhos test network. The filament supply of the Test Instrument is used to simulate the grid signal, while an external decade resistor simulates the plate resistance.

PB-181 621
Bureau of Naval Weapons, Washington, D. C.
ELECTRONIC COUNTERS. Technical manual, BuWeps-BuShips Calibration Program. 1 Aug 63, 23p
Instrument Calibration Procedure AF-11
OTS $0.75

DESCRIPTORS: Instruction manuals, *Electronic equipment, Calibration, Test equipment (Electronics).

This procedure describes the calibration of electronic counters with time base accuracies no better than 1 part in 10^7. The power supply voltages are measured with a D-V EVM. Regulation of each of the regulated supplies is tested by observing the changes from nominal with input line voltages of 105 and 125 volts. The ripple voltage on each supply is measured with an A-V EVM.

PB-181 607
Bureau of Naval Weapons, Washington, D. C.
ELECTRONIC VOLTMETERS, HEWLETT PACKARD 400C OR ME-30/U (USING THE RFL 1605). Technical manual, BuWeps-BuShips Calibration Program.
1 Apr 63, 22p Instrument Calibration Procedure AE-30
OTS $0.75

DESCRIPTORS: Instruction manuals, Electronic equipment, *Voltmeters, Calibration, Test equipment (Electronics),

This procedure describes the calibration of the Hewlett Packard 400C and the ME-30/U electronic voltmeters, which measure full-scale voltages from 0.001 to 300 volts at frequencies from 20 cps to 2 Mc.

PB-181 662
Bureau of Naval Weapons, Washington, D. C.
FREQUENCY-POWER METER TS-230/AP, TS-230A/AP, TS-230B/AP. Technical manual, BuWeps-BuShips Calibration Program. 1 Jul 63, 22p
Instrument Calibration Procedure GQ-07
OTS $0.75

DESCRIPTORS: Instruction manuals, *Frequency meters, *Power meters, Calibration, Test equipment (Electronics)

The thermistor bridge and balancing circuits are tested by calibrating the power meter linearity at three points, 0, -3, and -7 dbm. Each point is established with an external power meter and thermistor. The attenuator is calibrated over a range of 0 to -30 dbm, using an RF substitution technique. Two methods are provided for calibrating the frequency dial of the frequency-power meter. The first method uses a precision, absorption-type cavity frequency meter. The second method for calibrating the frequency dial uses a frequency measurement system consisting of the transfer oscillator and electronic counter.

PB-181 646
Bureau of Naval Weapons, Washington, D. C.
GENERAL PURPOSE OSCILLOSCOPES. Technical manual, BuWeps-BuShips Calibration Program.
1 Apr 63, 22p
Instrument Calibration Procedure AW-18
OTS $0.75

DESCRIPTORS: *Oscilloscopes, Calibration, Instruction manuals, Test equipment (Electronics).

The procedure describes the calibration of, but is not necessarily limited to, the following oscilloscope models: DuMont 164, 164E, 168, 208, 224, 224A; Hycon 49; RCA 155B, 155C, 158; TS-489/U, -514/U; Navy Type 60020, 60064; I-134, -134A; OS-1/U, -8/U.

PB-181 616
Bureau of Naval Weapons, Washington, D. C.
HIGH-GAIN DC DIFFERENTIAL PREAMPLIFIER TEKTRONIX 53/54D OR D. Technical manual, BuWeps-BuShips Calibration Program. 15 Aug 63, 24p
Instrument Calibration Procedure AA-16
OTS $0.75

DESCRIPTORS: Instruction manuals, *Preamplifiers, Amplifiers, Calibration, Test equipment (Electronics).

The Test Instrument is a differential high-gain dc preamplifier. It has a selector switch that provides for use of either of two imputs separately, or both together differentially, either ac or dc-coupled. Panel controls are provided for input attenuation, differential balance, and vertical positioning. A calibrated step control and a continuously variable control are provided to attenuate the signal within the amplifier. It has internal controls for adjusting the input capacitance, amplifier balance, and attenuator frequency response.

PB-181 651
Bureau of Naval Weapons, Washington, D. C.
IMPEDANCE BRIDGE, ELECTRO-MEASUREMENTS 250 DA AN/URM-90, TS-460C/U. Technical manual, BuWeps-BuShips Calibration Program. 1 Jul 63, 17p
Instrument Calibration Procedure AZ-02, supersedes rept. dated 18 May 59
OTS $0.50

DESCRIPTORS: Instruction manuals, *Impedance bridges, Calibration, Test equipment (Electronics), Resistance (Electrical),

The oscillator frequency is measured with the electronic counter. The bridge resistors are tested by connecting a decade resistor as one arm of the bridge. The decade resistor is adjusted for a null indication on the galvanometer at various resistance settings on the bridge. The accuracy of the capacitance measuring circuits is determined with a standard capacitor. The standard capacitor is connected in one arm of the bridge while an internal capacitor is in another arm. When the bridge is balanced, as indicated on the tuning eye, the value of the standard capacitor should be indicated on the dials, and any deviation is due to the internal capacitor and associated circuits. An autotransformer is used in lieu of an inductor to perform a functional check of the inductance measuring circuit. The dissipation factor dial is calibrated by using specified values of capacitance and resistance to give known dissipation factors.

PB-181 652
Bureau of Naval Weapons, Washington, D. C.
IMPEDANCE BRIDGE, GENERAL RADIO 650-A, OJ-1, OJ-2, OJ-3. Technical manual, BuWeps-BuShips Calibration Program. 1 Jul 63, 14p
Instrument Calibration Procedure AZ-09, supersedes rept. dated 25 Jul 60
OTS $0.50

DESCRIPTORS: Instruction manuals, *Impedance bridges, Calibration, Test equipment (Electronics),

A VOM is used to measure the battery voltage. An electronic counter is used to measure the frequency of an internal generator. A decade resistor is used to verify the linearity of the CRL dial, and the range multipliers of the multiply CRL dial by switch. A standard capacitor is used to verify the accuracy of the internal capacitance standards. A decade resistor and a standard capacitor are used to verify the dissipation factor accuracy indicated by the D and D-Q dials. The Q dial is checked by measuring the actual resistance of the rheostat.

PB-181 641
Bureau of Naval Weapons, Washington, D. C.
MEGOHM BRIDGE, GENERAL RADIO 544-B, ZM-9/U. Technical manual, BuWeps-BuShips Calibration Program. 1 Jul 63, 11p
Instrument Calibration Procedure AR-04
OTS $0.50

DESCRIPTORS: *Electric bridges, Resistance, Calibration, Instruction manuals, Test equipment (Electronics)

The sensitivity of the null detector system is tested by setting the bridge to a predetermined degree of unbalance, and observing the deflection of the galvanometer pointer. The d-c voltage available at the bridge terminals is measured, and, if the voltage is supplied from an a-c source, the ripple in the voltage is measured. The megohm dial calibration and the bridge elements are tested by connecting resistances of known values to the bridge, and using the Test Instrument to determine its own error.

PB-181 660
Bureau of Naval Weapons, Washington, D. C.
MICROWAVE POWER METERS, HEWLETT-PACKARD 430C AND 430B-95B (MODIFIED) SPERRY MICROLINE 31A1. Technical manual, BuWeps-BuShips Calibration Program. 15 Jul 63, 19p
Instrument Calibration Procedure GP-02, supersedes rept. dated 28 Oct 60, rev. Jan 62
OTS $0.50

DESCRIPTORS: Instruction manuals, *Power meters, Microwaves, Calibration, Test equipment (Electronics)

The Test Instrument consists of a self-balancing ac bridge using an external bolometer as one arm. The bridge is initially balanced by direct current (bias) and power from an oscillator. External power applied to the bolometer unbalances the bridge and reduces the oscillator output. An internal voltmeter measures the amount of oscillator power decrease and is calibrated to indicate the change as external power.

PB-181 609
Bureau of Naval Weapons, Washington, D. C.
OHMMETER ZM-1/U, ZM-1A/U, ZM-1B/U. Technical manual, BuWeps-BuShips Calibration Program. 1 Jun 63, 8p
Instrument Calibration Procedure AR-08
OTS $0.50

DESCRIPTORS: Instruction manuals, *Ohmmeters, Calibration, Resistors,

The calibration of the Test Instrument is performed by comparing the indication of the Test Instrument to the known value of a decade resistor.

PB-181 624
Bureau of Naval Weapons, Washington, D. C.
OSCILLATOR RADIO FREQUENCY SG-404/UR (P/O THE AN/URM-134 RADIO TEST SET) OR THE PANORAMIC RF-7a (P/O THE PANORAMIC SSB-3a SINGLE SIDEBAND SPECTRUM ANALYZER). Technical manual, BuWeps-BuShips Calibration Program. 15 Jun 63, 10p Instrument Calibration Procedure AG-25
OTS $0.50

DESCRIPTORS: Instruction manuals, *Radiofrequency oscillators, *Spectrum analyzers, Calibration, Test equipment (Electronics), Tests.

The Test Instrument is an inductance tuned RF oscillator that generates frequencies from 2.5 to 40.0 megacycles at a nominal 0.3 volt output. The output voltage is monitored by a meter. The output voltage and the panel meter are tested across the entire frequency range, by measuring the output voltage with an EVM. Frequency accuracy is testes by measuring selected frequencies on each range with an electronic counter.

PB-181 642
Bureau of Naval Weapons, Washington, D. C.
OSCILLOSCOPE, DUMONT 304H. Technical manual, BuWeps-BuShips Calibration Program. 1 Apr 63, 14p
Instrument Calibration Procedure AW-01
OTS $0.50

DESCRIPTORS: *Oscilloscopes, Calibration, Instruction manuals, Test equipment (Electronics).

The Test instrument is a general purpose oscilloscope consisting basically of a vertical amplifier, a vertical attenuator network, and a sweep circuit. The sensitivity and linearity of the vertical amplifier are tested by using the output of an oscillator, monitored by an EVM, as a calibrated voltage source. The linearity of the horizontal amplifier is tested in the same manner as that of the vertical amplifier. The compensation of the vertical attenuator is checked by observing the waveform presentation that is produced by an external square-wave generator for evidence of distortion. The operation of the sweep circuit is functionally tested by using an external oscillator as a signal source, and observing the resulting sine-wave presentation.

PB-181 647
Bureau of Naval Weapons, Washington, D. C.
OSCILLOSCOPE, DUMONT 401A OR 401AR. Technical manual, BuWeps-BuShips Calibration Program 1 Sep 63, 17p
Instrumentation Calibration Procedure AW-20
OTS $0.50

DESCRIPTORS: Instruction manuals, *Oscilloscopes, Calibration, Test equipment (Electronics),

Regulation is tested by verifying that a displayed signal remains stable and unchanged in amplitude as the line voltage is changed to 105 and 125 volts. Sweep time is measured by displaying timing pulses on the CRT, and recording the distance (in cm.) between specified pulses. The trigger output voltage is measured by displaying the signal on an external oscilloscope that has a calibrated vertical gain. The voltage calibrators are tested by applying an accurately known voltage to the Test Instrument and comparing the calibrator voltage to the applied signal. The input attenuators are tested by comparison with an EVM attenuator, maintaining a CRT reference indication by adjusting the input signal level and reading the error on an EVM. Frequency response is tested by comparing displayed sine wave signals of 1 kc and 100 kc, and recording the difference in amplitude. The input voltage is maintained at a constant value, as measured with an EVM.

PB-181 648
Bureau of Naval Weapons, Washington, D. C.
OSCILLOSCOPE, HEWLETT-PACKARD 122A AND 122AR. Technical manual, BuWeps-BuShips Calibration Program. 1 Jul 63, 19p
Instrument Calibration Procedure AW-22
OTS $0.50

DESCRIPTORS: Instruction manuals, *Oscilloscopes, Calibration, Test equipment (Electronics)

The Test Instrument is an oscilloscope consisting of an internal calibrator, dual vertical amplifiers providing chopped, alternate, or separate presentation with a 10 millivolt per centimeter sensitivity, and a 200 kc bandwith. It has calibrated sweep ranges from 5 microseconds per centimeter to 200 milliseconds per centimeter. A magnifier provides a sweep time of 1 microsecond per centimeter.

PB-181 644
Bureau of Naval Weapons, Washington, D. C.
OSCILLOSCOPE OS-4/AP(AN/USM-25). Technical manual, BuWeps-BuShips Calibration Program. 1 Jul 63, 27p
Instrument Calibration Procedure AW-15
OTS $0.75

DESCRIPTORS: *Oscilloscopes, Calibration, Instruction manuals, Test equipment (Electronics).

The OS-4/AP(AN/USM-25) is an oscilloscope with additional circuits to provide time delay, or range, measurements. It has a vertical sensitivity of 0.5 volts/inch, and a frequency response from 3 cps to 11 Mc. The trigger pulses, markers, and a vertical calibration voltage are available on the front panel. Sweep time is continuously variable from 1.2 to 12,000 microseconds. Markers for time delay measurements are derived from an internal crystal-controlled oscillator. The calibration procedure is described.

PB-181 645
Bureau of Naval Weapons, Washington, D. C.
OSCILLOSCOPE OS-34/USM-32. Technical manual, BuWeps-BuShips Calibration Program. 15 Sep 63, 18p
Instrument Calibration Procedure AW-16, supersedes rept. dated 1 Apr 62
OTS $0.50

DESCRIPTORS: *Oscilloscopes, Calibration, Instruction manuals, Test equipment (Electronics).

This procedure describes the calibration of the OS-34/USM-32 oscilloscope, which is a portable cathode-ray tube instrument designed to investigate electrical waveforms of radar sets and related equipment. The Test Instrument consists primarily of a vertical amplifier, vertical input attenuator, voltage calibrator, sweep circuits, trigger generator, time mark generator, and a power supply.

PB-181 610
Bureau of Naval Weapons, Washington, D. C.
OSCILLOSCOPE OS-37/UPM-45. Technical manual, BuWeps-BuShips Calibration Program. 15 Mar 63, 20p
Instrument Calibration Procedure AW-19
OTS $0.50

DESCRIPTORS: Instruction manuals, *Oscilloscopes, Calibration, Cathode ray tubes, Attenuators, Amplifiers, Sweep generators, Test equipment (Electronics),

This procedure describes the calibration of the OS-37/UPM-45 oscilloscope, which is a portable dual-beam cathode ray instrument designed for monitoring radar systems and for the investigation of pulses in radar circuits and associated equipment.

PB-181 638
Bureau of Naval Weapons, Washington, D. C.
PORTABLE DC MULTIMETER RAWSON TYPE 501A. Technical manual, BuWeps-BuShips Calibration Program. 15 Jun 63, 12p
Instrument Calibration Procedure AQ-10
OTS $0.50

DESCRIPTORS: *Multimeters, Calibration, Instruction manuals, Test equipment (Electronics).

The linearity test is made on the one-volt full-scale range. A precision potentiometer is used to measure the input voltages required to deflect the pointer to each major scale division. The voltage ranges below one volt full scale are calibrated at full scale by the same method. In each remaining voltage range, the input voltage required to obtain a full-scale indication is computed from the control settings of the voltage source. Each current range is tested at full scale by the IR-drop method, using the precision potentiometer to measure the voltage drop across a standard resistor in series with the current source.

PB-181 619
Bureau of Naval Weapons, Washington, D. C.
POTENTIOMETER AND MILLIVOLT SOURCE ALINCO P-55. Technical manual, BuWeps-BuShips Calibration Program. 1 Jun 63, 8p
Instrument Calibration Procedure AE-07
OTS $0.50

DESCRIPTORS: *Instruction manuals, *Potentiometers, Calibration, Test equipment (Electronics).

The Alinco P-55 potentiometer is calibrated by using a potentiometer to measure the voltage at specified control settings.

PB-181 630
Bureau of Naval Weapons, Washington, D. C.
POWER SUPPLY, JOHN FLUKE 406. Technical manual, BuWeps-BuShips Calibration Program. 1 Jun 63, 17p
Instrument Calibration Procedure AH-01
OTS $0.50

DESCRIPTORS: *Power supplies, Direct current, Calibration, Instruction manuals, Test equipment (Electronics).

The voltage calibration test is performed by measuring the output voltage at the 0-225v BIAS terminals with a differential voltmeter, and an internal adjustment made to bring the voltage to exactly 225 volts, if necessary. This test is repeated by measuring an output of 475 volts at the 0-500v terminals. The voltage at the 0-22.5v output terminals is also measured with the differential voltmeter. The linearity of the Test Instrument meter is tested on the voltage scale at 10 major-scale values by using the differential voltmeter. The regulation, ripple, and meter tests are performed by measuring the output voltage at the 0-500v terminals at line voltages of 105 and 130 volts with no load connected, and at 115v, full load. Linearity of the panel meter current scale is measured by varying the load resistance across the 0-500v terminals and recording the meter indications. The regulation and ripple tests are repeated at the 0-225v terminals. The voltage at the 6.3 AC 3A terminals is measured with an EVM.

PB-181 661
Bureau of Naval Weapons, Washington, D. C.
RADAR TEST SET TS-642/UPM-56. Technical manual, BuWeps-BuShips Calibration Program. 15 Jun 63, 28p
Instrument Calibration Procedure GQ-05
OTS $0.75

DESCRIPTORS: Instruction manuals, *Test sets, Radar, Calibration, *Signal generators, Test equipment (Electronics)

This procedure describes the calibration of the TS-642/U, which is the major component of the AN/UPM-56 Radar Test Set. The TS-642/U is primarily a multipurpose microwave signal generator incorporating a power meter and a frequency meter. The test set oscillator is functionally tested to verify correct operation prior to calibration. A standard power meter is used to measure the power output from minimum attenuation to -5 dbm on the variable output attenuator. The RF power meter linearity is also tested with a standard power meter. The frequency dial is calibrated with a high accuracy (± .0002%) frequency measurement system consisting of the electronic counter and transfer oscillator.

PB-181 608
Bureau of Naval Weapons, Washington, D. C.
RECORDING DC MILLIAMMETER, ESTERLINE-ANGUS AW 424 RD-49/U. Technical manual, BuWeps-BuShips Calibration Program. 1 Jun 63, 9p
Instrument Calibration Procedure AI-04
OTS $0.50

DESCRIPTORS: Instruction manuals, *Multimeters, Calibration, Measurement, Resistance (Electrical), *Ammeters, Test equipment (Electronics),

The Test Instrument is a dc recording milliammeter with a range of 1.0 milliampere full scale. A power supply, a decade resistor, and the Test Instrument are connected in series. The power supply and decade resistor are adjusted to develop the required current to perform the linearity and repeatability tests. The Test Instrument internal resistance is measured by comparing it to an added standard resistance which divides the Test Instrument full-scale value in half with the source voltage held constant.

PB-181 629
Bureau of Naval Weapons, Washington, D. C.
RF SIGNAL GENERATOR AN/URM-25F. Technical manual, BuWeps-BuShips Calibration Program. 1 Jul 63, 20p
Instrument Calibration Procedure AG-44
OTS $0.50

DESCRIPTORS: Instruction manuals, Radiofrequency, *Signal generators, Calibration, Test equipment (Electronics).

This procedure describes the calibration of the AN/URM-25F RF Signal Generator Set, which is designed to produce radio frequency signals that are continuously variable from 0.1 to 100,000 microvolts, modulated or unmodulated, over a continuous frequency range of 10 kc to 50 Mc.

PB-181 628
Bureau of Naval Weapons, Washington, D. C.
RF SIGNAL GENERATOR SET AN/URM-25D AND AN/URM-25E. Technical manual; BuWeps-BuShips Calibration Program. 15 Jun 63, 19p
Instrument Calibration Procedure AG-40
OTS $0.50

DESCRIPTORS: Instruction manuals, Radiofrequency, *Signal generators, Calibration, Test equipment (Electronics).

This procedure describes the calibration of the AN/URM-25D and AN/URM-25E RF Signal Generator Sets, which are designed to produce radio frequency signals that are continuously variable from 0.1 to 100,000 microvolts, modulated or unmodulated, over a continuous frequency range of 10 kc to 50 Mc.

PB-181 634
Bureau of Naval Weapons, Washington, D. C.
SERVO ANALYZER (SERVOSCOPE), SERVO CORPORATION 1100A, B, C, D. Technical manual, BuWeps-BuShips Calibration Program. 1 Aug 63, 34p
Instrument Calibration Procedure AQ-01
OTS $1.00

DESCRIPTORS: *Servomechanisms, *Test equipment (Electronics), Calibration, Instruction manuals

The servo analyzer is essentially a low-frequency signal generator, capable of measuring the phase and amplitude response of the servomechanism under test with respect to the signals generated by the Test Instrument. A total frequency range of .001 to 60 cps is covered by four models. A linear sweep, synchronized with the output signals, is generated by the Test Instrument to provide an external oscilloscope presentation.

PB-181 656
Bureau of Naval Weapons, Washington, D. C.
SIGNAL GENERATOR AN/URM-64 (TS-419/U) AN/URM-64A (TS-419A/U). Technical manual, BuWeps-BuShips Calibration Program. 14 Aug 63, 22p
Instrument Calibration Procedure GG-13
OTS $0.75

DESCRIPTORS: Instruction manuals, *Signal generators, Calibration, Test equipment (Electronics).

This procedure describes the calibration of the AN/URM-64 or AN/URM-64A signal generator, which consists of the TS-419/U or TS-419A/U signal generator and accessories. The frequency dial is calibrated by measuring the frequency at 200-Mc intervals over the frequency range with a transfer oscillator and electronic counter. The sync output delayed and undelayed pulses are tested for amplitude and rise time as measured on a calibrated oscilloscope. The internal modulation pulse and its width control are calibrated by comparing several pulse width dial settings with the oscilloscope calibrated sweep frequency. The external modulation circuitry is also functionally tested by viewing the demodulated signal on the oscilloscope. The output power is measured with a thermistor and standard power meter.

PB-181 612
Bureau of Naval Weapons, Washington, D. C.
SIGNAL GENERATOR, HEWLETT PACKARD 616A AND 616B TS-403/U AND TS-403A/U (AN/URM-61) TS-403B/U (AN/URM-61A) SG-153. Technical manual, BuWeps-BuShips Calibration Program. 1 Jul 63, 30p
Instrument Calibration Procedure GG-09
OTS $0.75

DESCRIPTORS: Instruction manuals, *Signal generators, Calibration, Test equipment (Electronics),

The Test Instrument is an RF signal generator operating within the frequency range from 1.8 to 4.0 Gc and has a calibrated power output (the TS-403B/U and the HP 616B have an extended frequency range to 4.2 Gc). The RF output can be CW, internally or externally pulse or square-wave modulated, or internally frequency modulated. The RF output pulse can be delayed from 3 to 300 microseconds, the width is variable from 1 to 10 microseconds, and the repetition rate is variable from 40 to 4000 pulses per second. There are two video outputs for synchronization, one of which is delayable.

PB-181 623
Bureau of Naval Weapons, Washington, D. C.
SIGNAL GENERATOR SG-403/URT (P/O THE AN/URM-134 RADIO TEST SET) OR THE PANORAMIC RADIO PRODUCTS TTG-2 (P/O THE PANORAMIC SSB-3a SINGLE SIDEBAND SPECTRUM ANALYZER). Technical manual, BuWeps-BuShips Calibration Program. 15 Jun 63, 17p
Instrument Calibration Program AG-23
OTS $0.50

DESCRIPTORS: Instruction manuals, *Signal generators, *Spectrum analyzers, Test equipment (Electronics), Calibration.

The Test Instrument contains two independent low-distortion audio oscillators, a passive mixing network, a metering circuit to monitor output voltage, and an output attenuator. Each oscillator generates frequencies from 100 cps to 10 kc. The minimum and maximum output voltage of each oscillator and the combined output voltage are measured at the balanced output terminals with an EVM. The unbalanced output voltage of each oscillator is measured with an EVM. The accuracy and frequency response of the panel meter is tested by direct comparison to an EVM. The output attenuator down to 60 db is tested by direct comparison with an EVM. Below 60 db, a standing wave indicator is used. Distortion of both oscillators at several frequencies is measured with a distortion analyzer. The frequency accuracy of each oscillator is tested with an electronic counter.

PB-181 665
Bureau of Naval Weapons, Washington, D. C.
STANDING WAVE INDICATOR IM-89/UR. Technical manual, BuWeps-BuShips Calibration Program. 15 May 63, 10p Instrument Calibration Procedure GV-05, supersedes rept. dated 15 Oct 62, PB-181 499
OTS $0.50

DESCRIPTORS: Instruction manuals, *Standing wave indicators, Calibration, Test equipment (Electronics),

This procedure describes the calibration of the IM-89/UR Standing Wave Indicator, which is basically a double-ended power measuring device designed to measure VSWR from 1.0 to 6.0 or reflected power from 0 to 50%. It consists of a primary coaxial line (51.5Ω nominal), a d-c microammeter, and a bi-directional coupling structure. The coupling device includes a crystal rectifier and associated R-C networks designed to detect the RF input power in the forward direction. The resultant d-c component is applied to the d-c microammeter, whose scale is calibrated to indicate the percent of reflected power or VSWR when the coupler is switched to the reverse position. (Author)

PB-181 663
Bureau of Naval Weapons, Washington, D. C.
STANDING WAVE RATIO METER, HEWLETT-PACKARD 415C OR D. Technical manual, BuWeps-BuShips Calibration Program. 1 Jan 63, 20p
Instrument Calibration Procedure GV-04
OTS $0.50

DESCRIPTORS: Instruction manuals, *Standing wave ratios, *Standing wave indicators, Calibration, Attenuators, Tuned amplifiers, Test equipment (Electronics)

This procedure describes the calibration of the Hewlett-Packard 415C or D Standing Wave Ratio Meter, which is essentially a tunable, high-grain, narrow brand amplifier, with a calibrated meter output. The Test Instrument consists primarily of a range attenuator, a tunable amplifier, an expand circuit, and a power supply.

PB-181 657
Bureau of Naval Weapons, Washington, D. C.
TEST OSCILLATOR FXR 772 SERIES. Technical manual, BuWeps-BuShips Calibration Program. 15 Sep 63, 17p
Instrument Calibration Procedure GG-15
OTS $0.50

DESCRIPTORS: Instruction manuals, *Oscillators, Calibration, Test equipment (Electronics)

This procedure describes the calibration of the FXR L772A, S772A, C772A and X772A test oscillators A power meter with a thermistor mount is used to calibrate the test oscillator power output. The test oscillator frequency dial is calibrated by a comparison technique. The frequency dial is adjusted to the calibration frequency, and a frequency meter in the line, terminated by a thermistor mount and power meter, is adjusted to obtain a resonant condition as indicated by a resonant dip on the power meter. The frequency meter indication is then recorded as the measured value.

PB-181 627
Bureau of Naval Weapons, Washington, D. C.
TEST OSCILLATOR TO-258 AND TO-100 (TELETRONICS LABORATORY, INC.). Technical manual, BuWeps-BuShips Calibration Program. 1 Jun 63, 13p
Instrument Calibration Procedure AG-39
OTS $0.50

DESCRIPTORS: Instruction manuals, *Oscillators, Audiofrequency oscillators, Calibration, Test equipment (Electronics),

The Test Instrument is an oscillator designed to provide twenty push-button-selected frequencies in the audio and ultrasonic ranges. A calibrated panel control permits small variations of the selected frequency. An electron-ray tube and heterodyne circuit provide zero-beat indication of an external signal.

PB-181 632
Bureau of Naval Weapons, Washington, D. C.
THERMO-MILLIAMMETER INSTRUMENTS, 1.0 TO 1000 MA FULL SCALE. Technical manual, BuWeps-BuShips Calibration Program. 1 Jun 63, 11p
Instrument Calibration Procedure AI-03
OTS $0.50

DESCRIPTORS: *Temperature sensitive elements, *Ammeters, Calibration, Test equipment (Electronics)

The measurements are accomplished by connecting the appropriate standard resistor in series with the Test Instrument and current supply, and the potentiometer in parallel with the standard resistor. The required amount of current is applied to the Test Instrument, and the voltage drop is measured with the potentiometer. The value of the unknown current is calculated by dividing the potentiometer voltage indication by the value of the standard resistor. A linearity test is performed on the most suitable range of the Test Instrument. Full- and half-scale measurements are performed for all remaining ranges of the instrument.

PB-181 654
Bureau of Naval Weapons, Washington, D. C.
UNSATURATED STANDARD CELLS. Technical manual, BuWeps-BuShips Calibration Program 15 Jun 63, 11p
Cross-check Procedure CE-01
OTS $0.50

DESCRIPTORS: Instruction manuals, *Electrolytic cells, Calibration, Test equipment (Electronics), *Batteries and components, Standards,

The method used in this procedure compares the measured difference of two series-opposed standard cells with the computed difference of their certified values. Spurious emf originating in the potentiometric circuit is determined, and brought within the allowable limit before proceeding with the cross-check. A successful cross-check provides assurance that neither instrument has drifted significantly since the last certification. If the cross-check tolerance is exceeded, however, either or both instruments may be at fault, and other methods must be employed to check each value.

PB-181 613
Bureau of Naval Weapons, Washington, D. C.
VARIABLE ELECTRONIC FILTER, SPENCER KENNEDY 302. Technical manual, BuWeps-BuShips Calibration Program. 15 Jul 63, 36p
Instrument Calibration Procedure AA-02
OTS $1.00

DESCRIPTORS: Instruction manuals, *Filters (Electromagnetic wave), *Band-pass filters, Calibration, Test equipment (Electronics).

This procedure describes the calibration of the Spencer Kennedy 302 variable electronic filter, which is a two-section, variable-frequency electronic filter. Each section can be operated independently as either a high pass or as a low-pass device with cut-off frequencies variable from 20 cps to 200 kc. Both sections can be used simultaneously to form a band-pass filter.

PB-181 622
Bureau of Naval Weapons, Washington, D. C.
VHF SIGNAL GENERATOR, HEWLETT-PACKARD 608A, 608C, 608D TS-510/U(AN/USM-44) OR TS-510A/U (AN/USM-44A). Technical manual, BuWeps-BuShips Calibration Program. 1 Jun 62, changed 1 Mar 63, 28p
Instrument Calibration Procedure AG-06, change notice
OTS $0.75

DESCRIPTORS: Very high frequency, *Signal generators, Calibration, Instruction manuals, Radiofrequency

The HP 608D or the AN/USM-44 furnishes RF signals from 0.1 μv to 0.5v over the frequency range of 10 to 420 Mc, while the HP 608C furnishes RF signals from 0.1 μv to 1.0v over the frequency range of 10 to 480 Mc. The HP 608A furnishes RF signals from 0.1 μv to 1.0v over the frequency range of 10 to 500 Mc. All units have provisions for external pulse modulation and internal or external sine wave modulation. The HP 608D and AN/USM-44 units have a crystal-controlled heterodyne calibrator providing 1 mc and 5 mc check points over the entire frequency range.

PB-181 640
Bureau of Naval Weapons, Washington, D. C.
WHEATSTONE BRIDGE OHMMETER, LEEDS AND NORTHRUP 4282. Technical manual, BuWeps-BuShips Calibration Program. 15 May 63, 14p
Instrument Calibration Procedure AR-02
OTS $0.50

DESCRIPTORS: *Ohmmeters, *Electric bridges, Calibration, Instruction manuals, Test equipment (Electronics).

A VOM is used to verify that the internal dry cell is not below a specified voltage. The internal standard resistors are compared to certified standard resistors, using a Wheatstone Bridge to perform the measurements. The linearity of the slidewire dial is tested by using an external standard resistor and a decade resistor. Three resistance values are set on the decade resistor and measured with the test instrument. The slidewire dial indications must fall within predetermined limits to prove linearity.

PB-181 614
Bureau of Naval Weapons, Washington, D. C.
WIDE-BAND HIGH-GAIN PREAMPLIFIER TEKTRONIX 53B. Technical manual, BuWeps-BuShips Calibration Program. 1 Jun 63, 22p
Instrument Calibration Procedure AA-04
OTS $0.75

DESCRIPTORS: Instruction manuals, Broadband, *Preamplifiers, *Amplifiers, Calibration, Test equipment (Electronics).

The Test Instrument is a plug-in, wide-band, high-gain preamplifier used with the Tektronix 535 oscilloscope. It has an input selector for either a dc- or an ac-coupled signal from either of two inputs. Calibrated step attenuation and vertical positioning controls are provided. It has internal controls for adjusting gain, balance, frequency response, and input capacitance.

GPO C 13.46:175
Central Radio Propagation Lab., National Bureau of Standards, Boulder, Colo.
CURVES OF GROUND PROXIMITY LOSS FOR DIPOLE ANTENNAS
L. E. Vogler and J. L. Noble. 20 May 63, 39p
Technical note 175; N63-16900
GPO $0.30

DESCRIPTORS: *Antennas, *Dipole antennas, *Radio waves, Absorption, Graphic analysis, Space communication systems, Moon

Ground proximity loss, defined as the decibel ratio of antenna input resistance to its free space resistance, is presented in graphical form for four types of antennas: vertical and horizontal electric and magnetic elementary dipoles. Assuming a non-layered ground characterized throughout by a relative dielectric constance ϵ_r and conductivity σ, curves are given showing the ground proximity loss for a wide range of values of ground constants, antenna height above the ground surface, and frequency. (Author)

N64-10342
Electro-Optical Systems, Inc., Pasadena, Calif.
A STEADY STATE HALL CURRENT ACCELERATOR. Quarterly progress rept. no. 2, 17 Aug-16 Nov 62
G. L. Cann, G. L. Marlotte, and R. W. Ziemer
14 Dec 62, 43p
Contract NAS3-2500
EOS 3160-Q-2; NASA CR-52448
OTS $4.60

N64-12025
General Electric Co., Schenectady, N. Y.
RESEARCH STUDY ON THE USE OF AUXILIARY ELECTRODES IN SEALED SILVER-CADMIUM CELLS. Final project rept., Jul 62-Jun 63 [1963] 45p
Contract NAS5-2817
NASA CR-55014
OTS $4.60

N64-12031
Globe-Union Inc., Milwaukee, Wis.
THE DEVELOPMENT OF HIGH ENERGY DENSITY PRIMARY BATTERIES, 200 WATT HOURS PER POUND OF TOTAL BATTERY WEIGHT MINIMUM. Quarterly rept. no. 1, 1 Aug-31 Oct 63
Warren L. Towie. [1963] 55p
Contract NAS3-2790
NASA CR-55055
OTS $5.60

N64-10109
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
INVESTIGATION OF HF AND VHF ROCKET-BORNE SHROUD ANTENNAS
G. H. Spaid and J. R. Hagemeyer. May 63, 24p
Technical memo X-51059; NASA-X-613-102
OTS $2.60

N64-13285
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DISCHARGE BEHAVIOR OF THE AgO-Ag ELECTRODE
E. A. Butler. 22 Dec 63, 13p
Contract NAS7-100
Technical rept. no. 32-535; NASA CR-53002
OTS $1.60

AD-278 234
Magnavox Co., Fort Wayne, Ind.
QUARTZ CRYSTAL OSCILLATOR CIRCUITS. Quarterly progress rept. no. 3, 1 Jan-31 Mar 62
D. Firth. 20 Jul 62, 66p
Contract DA36-039-sc-88892
Serial no. TP62-554
OTS $6.60

DESCRIPTORS: *Oscillators, Circuits, Design, *Crystal oscillators, *Quartz, Crystals, *Electron tubes, Tetrodes, Triodes, Transistors, Amplifiers

A discussion is given of the design of vacuum tube crystal oscillators in the frequency range of 100 MC to 200 MC. The factors which influence crystal oscillator design at frequencies below 100 KC are also discussed. Detailed data on vacuum tube crystal oscillators operating at 100 MC, 150 MC, and 200 MC are included. (Author)

N64-13935
Monsanto Research Corp., Dayton, Ohio
DEVELOPMENT OF IMPROVED SINGLE CRYSTAL GALLIUM PHOSPHIDE SOLAR CELLS. Quarterly rept. no. 2, 12 Sep-12 Dec 63
W. O. Groves and A. S. Epstein. [1963] 63p
Contract NAS3-2776
NASA CR-55311
OTS $6.60

N64-11108
Monsanto Research Corp., Everett, Mass.
STUDY OF FUEL CELLS USING STORABLE ROCKET PROPELLANTS, Quarterly rept. no. 1, 28 Jun-28 Sep 63
J. O. Smith, R. E. Chute, R. G. Gentile, B. A. Gruber, and D. L. Kavanagh. 25 Oct 63, 84p
Contract NAS3-2791
Rept. no. MRB5002Q1; NASA CR-52860
OTS $8.10

GPO C 13.46:188
National Bureau of Standards, Washington, D. C.
CALIBRATION OF VOLT-AMPERE CONVERTERS
E. S. Williams. 25 Apr 63, 23p
Technical note 188
GPO $0.20

DESCRIPTORS: *Voltmeters, *Ammeters, Direct current, Standardization, Calibration, Instruction manuals, Test equipment (Electronics).

The notes were prepared to describe the National Bureau of Standards calibration services for volt-ampere converters (or transfer volt-ammeters), to suggest procedures for d-c standardization in the user's laboratory, and to describe a voltage comparator which can be used to make such calibrations quickly and easily. (Author)

PB-165 132
Naval Research Lab., Washington, D. C.
TRACKING RADAR EXTERNAL RANGE NOISE MEASUREMENTS AND ANALYSIS. Interim rept.
D. D. Howard and B. L. Lewis. 31 Aug 55, declassified 20 Oct 57, 23p
NRL rept. 4602; AD-72 960
OTS $2.60

DESCRIPTORS: *Tracking, Radar tracking, *Radar interference, Measurement, Analysis, Ranges (Establishments), Radar targets, Errors.

A preliminary investigation was made of external noise resulting from the finite target size in tracking radar range information using the PB4Y and SNB aircraft as targets. The power spectrum and amplitude distribution function of recorded external range noise is given for each view of these aircraft. The total rms external range noise is shown to be a function of target shape and size. A formula was developed which related target configuration to the total rms external range noise, and which allows the prediction of the rms noise for a given target. (Author)

N64-13917
TAPCO Div., Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
RESEARCH ON THE VORTEX MHD POWER GENERATOR. Final rept. [Apr 62-Jul 63]
W. C. Davis. Jul 63, 165p
Contract NAS3-2526
ER-5453; NASA CR-55310
OTS $12.00

N64-11800
TAPCO Div., Thompson Ramo Wooldridge Inc., Cleveland, Ohio.
SUNFLOWER POWER CONVERSION SYSTEM.
Quarterly rept. no. 14, Jun-Aug 63
Jay W. Picking, Jr. [1963] 27p
Rept. ER-5546; NASA CR-52962
OTS $2.60

N64-13496
Westinghouse Electric Corp., Baltimore, Md.
MOS, OPTICAL SYSTEMS STUDY. Monthly progress rept. no. 7, 20 Nov-20 Dec 63
W. F. Ward. [1963] 6p
Contract NAS w-703
NASA CR-55250
OTS $1.10

Mechanical Engineering

NAA-SR-8514
Atomic International, Canoga Park, Calif.
EXPERIMENTAL STRESS ANALYSIS OF 37-TUBE MODULAR STEAM GENERATOR HEAD
M. M. Lemcoe. 30 Jan 64, 19p
Contract AT(11-1)GEN-8
OTS $0.50

NAA-SR-8515
Atomics International, Canoga Park, Calif.
PHOTOELASTIC DETERMINATION OF STRESSES IN THE AI STEAM GENERATOR
M. M. Levin. 30 Jan 64, 52p
Contract AT(11-1)GEN-8
OTS $1.00

Ordnance, Missiles, and Satellite Vehicles

N64-10087
Aeronutronic, Newport Beach, Calif. Astrosciences Dept.
INVESTIGATION OF THE ORBITAL TRACKING OF A GEOSTATIONARY SATELLITE. VOLUME I OF II: THEORY AND METHODS
12 Feb 62, 56p
Contract NAS8-1639
U-1539; NASA CR-52204
OTS $5.60

N63-20532
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
INVESTIGATION OF WINGLESS MISSILE CONFIGURATIONS WITH FOLDING CONTROLS AND LOW-ASPECT-RATIO STABILIZING SURFACES
Frank A. Lazzeroni. 17 Sep 58, declassified 17 Jul 63. 34p
NACA RM A58F30
OTS $3.60

N64-11107
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SATELLITE SITUATION REPORT, VOLUME 3, NO. 22
15 Nov 63, 10p
Technical memo X-51205; NASA X-533-63-1
OTS $1.10

N64-13180
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE MARINER R PROJECT: VOLUME 2: SUPPLEMENTARY DOCUMENTATION. Progress rept., 1 Sep 62-3 Jan 63
1 Jul 63, 269p
Contract NAS7-100
Technical rept. no. 32-422, vol. 2; NASA CR-55205
OTS $17.00

NASA-TM-X-810
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE EXPLORER XVI MICROMETEROID SATELLITE DESCRIPTION AND PRELIMINARY RESULTS FOR THE PERIOD DECEMBER 16, 1962 THROUGH JANUARY 13, 1963
Earl C. Hastings, Jr., comp. Feb 63, 31p
N63-12639
OTS $0.75

Sanitation and Safety Engineering

CEX-59.7B
Edgerton, Germeshausen and Grier, Inc., Las Vegas, Nev.
EXPERIMENTAL RADIATION MEASUREMENTS IN CONVENTIONAL STRUCTURES: PART II. COMPARISON OF MEASUREMENTS IN ABOVE-GROUND AND BELOW-GROUND STRUCTURES FROM SIMULATED AND ACTUAL FALLOUT RADIATION
Z. G. Burson. Feb 63, 65p
OTS $1.50

ORNL-3507
Oak Ridge National Lab., Tenn.
CALCULATIONS OF THERMAL-NEUTRON FLUX DISTRIBUTIONS IN CONCRETE-WALLED DUCTS USING AN ALBEDO MODEL WITH MONTE CARLO TECHNIQUES
V. R. Cain. Master's thesis. 1963, 190p
Contract W7405-eng-26
OTS $2.75

ORNL-3464
Oak Ridge National Lab., Tenn.
A STUDY OF THE RADIATION SHIELDING CHARACTERISTICS OF BASIC CONCRETE STRUCTURES AT THE TOWER SHIELDING FACILITY
V. R. Cain. 1963, 65p
Contracts W7405-eng-26 and OCD-OS-62-145
OTS $1.75

FOOD, HANDLING, AND PACKAGING EQUIPMENT

PB-163 781 repriced
Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
A BIBLIOGRAPHY AND BIBLIOGRAPHIC REVIEW OF FOOD AND FOOD HABIT RESEARCH
David Gottlieb and Peter H. Rossi. Jan 61, 115p
Library Bull. no. 4; AD-252 604
OTS $9.60

DESCRIPTORS: Food, *Attitudes, *Bibliographies, *Nutrition, *Diet, Culture, Military personnel, Personality, Physiology, Consumption, Learning, Acceptability.

This bibliographic review attempts to provide an overview of the major lines of research on food habits, to summarize their major findings, and to point up their implications for research on inducing changes in food habits. This report was undertaken as a first step toward the design of research on the dynamics of food habits changes. The bibliographic review is therefore pointed primarily in this direction and cannot be considered a definitive summary of the very extensive literature on food. Although the attached bibliography probably covers a good portion of this considerable body of published materials, the review stresses mainly two kinds of researches: (1) those dealing with the evaluation or consumption of food as a cultural, social, or psychological phenomenon; and (2) those dealing with food acceptance or preference in a military or institutional context. (Author)

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Engines and Propulsion Systems

N64-13936
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
CONVECTIVE HEAT TRANSFER IN A CONVERGENT-DIVERGENT NOZZLE
L. H. Back, P. F. Massier, and H. L. Gier. 15 Nov 63, 35p
Contract NAS7-100
Technical rept. no. 32-415; NASA CR-55317
OTS $3.60

N63-20538
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN INVESTIGATION OF MODIFIED CLUSTERED JET-EXIT ARRANGEMENTS AT SUPERSONIC SPEEDS
Harry T. Norton, Jr., Willard E. Foss, Jr., and John M. Swihart. Jul 61, declassified 17 Jul 63, 40p
NASA TM X-540
OTS $3.60

NASA-TN-D-1962, suppl.
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
SUPERSONIC INVESTIGATION OF NOZZLE HINGE MOMENTS OF A MODIFIED SATURN C-1 MODEL WITH AND WITHOUT JET FLOW
Nickolai Charczenko and Jerry L. Lowery, Nov 63, 463p
N64-14063; suppl. to N63-23798
OTS $6.00

N63-17986
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
ANALYSIS OF THE LIQUID-METAL TURBOJET CYCLE FOR PROPULSION OF NUCLEAR POWERED AIRCRAFT
William W. Wachtl and Frank E. Rom. 19 Nov 51, declassified 12 Jun 63. 87p
NACA RM E51D30
OTS $8.10

N63-14761
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
ATTENUATION OF TANGENTIAL-PRESSURE OSCILLATIONS IN A LIQUID-OXYGEN -n-HEPTANE ROCKET ENGINE WITH LONGITUDINAL FINS
Richard J. Priem. 28 Jun 56, declassified 12 Mar 63. 38p
NACA RM E56C09
OTS $3.60

N63-20534
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
DESIGN AND EXPERIMENTAL INVESTIGATION OF A SINGLE-STAGE TURBINE WITH A ROTOR ENTERING RELATIVE MACH NUMBER OF 2
Thomas P. Moffitt. 15 Sep 58, declassified 17 Jul 63. 31p
NACA RM E58F20a
OTS $3.60

N63-17466
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
EXPERIMENTAL INVESTIGATION OF A 7-INCH-TIP-DIAMETER TRANSONIC TURBINE
Warren J. Whitney and William T. Wintucky. 16 Jan 58, declassified. 15p
NACA RM E57J29
OTS $1.60

N63-14760
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
EXPERIMENTAL SEA-LEVEL STATIC INVESTIGATION OF A SHORT AFTERBURNER.
James L. Harp, Jr., William E. Mallett, and Thomas B. Shillito. 11 May 54, declassified 12 Mar 63. 34p
NACA RM E54B18
OTS $3.60

N63-20531
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
INFLUENCE OF COMBUSTION-CHAMBER LENGTH ON AFTERBURNER PERFORMANCE
James W. Useller, Willis M. Braithwaite, and Carl J. Rudey. 27 Aug 54, declassified 17 Jul 63. 26p
NACA RM E54E06
OTS $2.60

N63-14762
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
INVESTIGATION OF AN AIR-COOLED, PLUG-TYPE, VARIABLE-AREA EXHAUST NOZZLE
G. R. Smolak and W. K. Koffel. 10 Apr 57, declassified 12 Mar 63. 39p
NACA RM E57A07
OTS $3.60

N63-16135
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
PERFORMANCE SUMMARY AND ANALYSIS OF A MACH 3.0 DESIGN AXISYMMETRIC ALL-EXTERNAL-COMPRESSION DOUBLE-CONE INLET FROM MACH NUMBER 3.0 TO 0.8
John L. Allen, Owen H. Davis, and Glenn A. Mitchell. Apr 60, declassified 18 Apr 63. 17p
NASA TM X-149
OTS $1.60

N64-11743
United Aircraft Corp., East Hartford, Conn.
INVESTIGATION OF NONEQUILIBRIUM FLOW EFFECTS IN HIGH EXPANSION NOZZLES. Final rept.
V. J. Sarli. 20 Sep 63, 182p
Contract NASw-366
Rept. no. B910056-12; NASA CR-52921
OTS $13.00

Manufacturing Equipment and Processes

SC-4959(M)
Sandia Corp., Albuquerque, N. Mex.
VISUAL AIDS FOR MANUFACTURING PERSONNEL
Joseph Crompton. Feb 64, 16p
Contract AT(29-1)789
OTS $0.50

MATERIALS

Ceramics and Refractories

N64-10612
Advanced Metals Research Corp., Somerville, Mass.
PROPERTIES OF NON-STOICHIOMETRIC METALLIC CARBIDES Quarterly progress rept. no. 2
Robert K. Lewis and John T. Norton. 12 Sep 63, 18p
Contract NASw-663
NASA CR-52420
OTS $1.60

IS-722
Ames Lab., Iowa State Univ. of Science and Tech.
CARBIDES
William A. Frad. Aug 63, 94p
Contract W7405-eng-82
OTS $2.00

GEMP-31A
General Electric Co., Cincinnati, Ohio.
HIGH-TEMPERATURE MATERIALS PROGRAM. Progress rept. no. 31, Part A. 24 Jan 64, 35p
Contract AT(40-1)2847
OTS $0.75

HW-76303
Hanford Atomic Products Operation, Richland, Wash.
CERAMICS RESEARCH AND DEVELOPMENT OPERATION. Quarterly rept. Jul-Sep 63. 27 Jan 64, 134p
Contract AT(45-1)1350
OTS $2.50

MLM-1169
Mound Lab., Miamisburg, Ohio.
PREPARATION AND PROPERTIES OF PLUTONIUM CARBIDE: A BIBLIOGRAPHY
C. P. Johnston, F. D. Lonadier, and J. A. Powers. Jul 63, 10p
Contract AT(33-1)GEN-53
OTS $0.50

Paints and Finishes

OTS-SB-518
Office of Technical Services, Dept. of Commerce, Washington, D.C.
PAINTS AND VARNISHES. Nov 63, 28p
OTS Selective Bibliography SB-518
OTS $0.10

DESCRIPTORS: *Paints, *Varnishes, *Bibliographies, Refractory coatings, Fire-resistant coatings, Plastic coatings, Manufacturing methods, Test methods,

Lists 398 domestic and foreign references on paint and varnishes added to the OTS collection during the period 1945 through July 1963. It includes reports on heat and fire resistant paints and varnishes; plastic and resin based paints; enamel coatings; paints for metal surfaces; manufacturing and development; tests, analysis and evaluation; uses of paints and varnishes. Also includes glossaries, bibliographies and specifications.

PB-181 550
Williams (Clyde) and Co., Columbus, Ohio.
FLUIDIZED-BED TECHNOLOGY. A BROADENING SPECTRUM IN COATINGS. [1963] 17p
Contract CC 4757
OTS $0.50

DESCRIPTORS: *Fluidized solids, Particles, Fluid flow, *Coatings, *Plastic coatings, *Epoxy plastics

An evaluation of commercial applications.

MATHEMATICS

WAPD-TM-369
Bettis Atomic Power Lab., Pittsburgh, Pa.
MULE. A FORTRAN PROGRAM FOR THE CALCULATION OF THREE TYPES OF OVERTONE MODES
R. L. Ewen. Oct 63, 63p
Contract AT(11-1)GEN-14
OTS $1.50

PB-181 668
Bureau of Naval Weapons, Washington, D. C.
MICROMETER CALIPERS, OUTSIDE DIAMETER TO 12 INCHES. Technical manual, BuWeps-BuShips Calibration Program. 1 Aug 63, 9p
Instrument Calibration Procedure MD-06
OTS $0.50

DESCRIPTORS: Instruction manuals, *Tools (Mathematical), *Micrometers, Calibration,

This procedure describes the calibration of micrometer calipers up to 12 inches outside diameter. The flatness and parallel tests of the anvil and spindle surfaces are performed by using the optical parallel and ball testers respectively. The micrometer calibration is performed by using gage blocks.

PB-181 667
Bureau of Naval Weapons, Washington, D. C.
OPTICAL TOOLING SCALE. Technical manual, BuWeps-BuShips Calibration Program. 1 Sep 63, 22p
Instrument Calibration Procedure MD-03
OTS $0.75

DESCRIPTORS: Instruction manuals, *Tools (Mathematical), Calibration, Micrometers, Microscopes,

The Test Instrument is a scale having a graduated length of 3, 10, 20, or 40 inches and is graduated in 0.1-inch increments, except that the 40-inch scale is not marked below the 19.5-inch graduation. Each graduation is defined as the midpoint of the space between the lines of a pair in a set of four pairs of lines having nominal spacings of 0.025 in., 0.010 in., 0.004 in., and 0.060 in.

N64-13284
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
CONTINUOUS ESTIMATION OF SEQUENTIALLY CORRELATED RANDOM VARIABLES
C. G. Pfeiffer. 30 Oct 63, 21p
Contract NAS7-100
Technical rept. no. 32-524; NASA CR-53016
OTS $2.60

SLAC-22
Stanford Linear Accelerator Center, Stanford Univ., Calif.
ON N-DIMENSIONAL TAYLOR AND LAGRANGE OPERATORS
K. G. Dedrick and E. L. Chu. Nov 63, 33p
Contract AT(04-3)400
OTS $0.75

MECHANICS

N63-17254
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AERODYNAMIC AND HYDRODYNAMIC CHARACTERISTICS OF A PROPOSED SUPERSONIC MULTIJET WATER-BASED HULL-TYPE AIRPLANE WITH A VARIABLE-INCIDENCE WING
William W. Petynia, Albin O. Pearson, and Roger H. Fournier. Apr 60, declassified 23 Apr 62. 91p
NASA TM X-249
OTS $8.60

N63-13114
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
AERODYNAMIC CHARACTERISTICS OF TWO RECTANGULAR-PLAN-FORM, ALL-MOVABLE CONTROLS IN COMBINATION WITH A SLENDER BODY OF REVOLUTION AT MACH NUMBERS FROM 3.00 TO 6.25
Thomas J. Wong and Hermilo R. Gloria. 28 Dec 55, declassified 16 Oct 61. 40p
Research memo no. RM A55J07
OTS $3.60

N63-20540
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
EFFECTS OF TRANSVERSE CENTER-OF-GRAVITY DISPLACEMENT, AFTERBODY GEOMETRY, AND FRONT-FACE CURVATURE ON THE AERODYNAMIC CHARACTERISTICS OF MERCURY-TYPE MODELS AT A MACH NUMBER OF 5.5
Peter F. Intrieri. Jun 61, declassified 17 Jul 63. 29p
NASA TM X-569
OTS $2.60

N63-13895
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
AN EXPERIMENTAL INVESTIGATION AT MACH NUMBERS FROM 2.1 TO 3.0 OF CIRCULAR INTERNAL-COMPRESSION INLETS HAVING TRANSLATABLE CENTERBODIES AND PROVISIONS FOR BOUNDARY-LAYER REMOVAL
Earl C. Watson. Jan 60, declassified 1 Apr 63. 27p
NASA TM X-156
OTS $2.60

N63-20535
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
FREE-FLIGHT MEASUREMENTS OF STATIC AND DYNAMIC STABILITY OF MODELS OF THE PROJECT MERCURY RE-ENTRY CAPSULE AT MACH NUMBERS 3 AND 9.5
Simon C. Sommer, Barbara J. Short, and Dale L. Compton. Aug 60, declassified 17 Jul 63. 42p
NASA TM X-373
OTS $4.60

N63-20541
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THE LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF A RE-ENTRY CONFIGURATION BASED ON A BLUNT 13° HALF-CONE AT MACH NUMBERS TO 0.92
George C. Kenyon and Fred B. Sutton. Jul 61, declassified 12 Nov 62. 64p
NASA TM X-571
OTS $6.60

N63-20536
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
MEASUREMENTS OF THERMAL RADIATION OF AIR FROM THE STAGNATION REGION OF BLUNT BODIES TRAVELING AT VELOCITIES UP TO 31,000 FEET PER SECOND
William A. Page, Thomas N. Canning, Roger A. Craig, and Jack D. Stephenson. Jun 61, declassified 17 Jul 63. 22p
NASA TM X-508
OTS $2.60

N63-14755
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
STABILITY AND CONTROL CHARACTERISTICS AT SUBSONIC SPEEDS OF A FLAT-TOP ARROWHEAD WING-BODY COMBINATION
Donald A. Buell and Norman S. Johnson, Mar 59, declassified 12 Mar 63. 55p
NASA MEMO 3-5-59A
OTS $5.60

N63-18047
Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
BOUNDARY-LAYER-TRANSITION MEASUREMENTS IN FULL-SCALE FLIGHT
Richard D. Banner, John G. McTigue, and Gilbert Petty, Jr. 28 Jul 58, declassified 12 Jun 63. 11p
NACA RM H58E28
OTS $1.60

N63-14767
Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
CONTROLLABILITY OF THE X-15 RESEARCH AIRPLANE WITH INTERIM ENGINES DURING HIGH-ALTITUDE FLIGHTS
Euclid C. Holleman and Donald Reisert. Mar 61, declassified 12 Mar 63. 22p
NASA TM X-514
OTS $2.60

N63-18039
Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
INVESTIGATION OF THE CHARACTERISTICS OF 6-FOOT DROGUE-STABILIZATION RIBBON PARACHUTES AT HIGH ALTITUDES AND LOW SUPERSONIC SPEEDS
Clinton T. Johnson. Nov 60, declassified 12 Jun 63. 38p
NASA TM X-448
OTS $3.60

N63-20533
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AERODYNAMIC CHARACTERISTICS OF LOW-ASPECT-RATIO WINGS AT HIGH SUPERSONIC MACH NUMBERS
Edward F. Ulmann and Mitchel H. Bertram. 2 Nov 53, declassified 17 Jul 63. 20p
NACA RM L53I23
OTS $1.60

N63-18040
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
DYNAMIC MODEL TESTS AT LOW SUBSONIC SPEEDS OF PROJECT MERCURY CAPSULE FON CONFIGURATIONS WITH AND WITHOUT DROGUE PARACHUTES
James S. Bowman, Jr. Feb 61, declassified 12 Jun 63. 22p
NASA TM X-459
OTS $2.60

N63-17995
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
DYNAMIC STABILITY AND DISPERSION OF A PROJECT MERCURY TEST CAPSULE UPON ENTERING THE ATMOSPHERE, WITH EFFECT OF ROLL RATE, CENTER-OF-GRAVITY DISPLACEMENT, AND THRESHOLD OF A RATE-REACTION CONTROL SYSTEM
Byron M. Jaquet, Jan 61, declassified 12 Jun 63. 79p
NASA TM X-350
OTS $7.60

NACA-RM-L57C11
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECT OF HINGE-LINE POSITION ON THE OSCILLATING HINGE MOMENTS AND FLUTTER CHARACTERISTICS OF A FLAP-TYPE CONTROL AT TRANSONIC SPEEDS
Robert F. Thompson and William C. Mosley, Jr. 10 Jun 57, declassified 12 Mar 63. 54p
N63-14763
OTS $1.50

N63-12762
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECT OF SEVERAL JET-ENGINE AIR-INLET CONFIGURATIONS ON THE LOW-SPEED STATIC LONGITUDINAL STABILITY CHARACTERISTICS AND QUANTITY FLOW OF A 1/6-SCALE MODEL OF THE MX-1764 AIRPLANE
Delwin R. Croom. 12 Jan 54, declassified 14 Sep 62. 21p
Research memo no. RM SL54A06.
OTS $2.60

N63-17450
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECTS OF SPOILER-SLOT-DEFLECTOR CONTROL ON THE AERODYNAMIC CHARACTERISTICS AT A MACH NUMBER OF 2.01 OF A VARIABLE-WING-SWEEP CONFIGURATION WITH THE OUTER WING PANELS SWEPT BACK 75°
Gerald V. Foster Apr 60, declassified 1 Apr 63. 16p
NASA TM X-273
OTS $1.60

N63-20528
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EXAMINATION OF RECENT LATERAL-STABILITY-DERIVATIVE DATA
Frank S. Malvestuto, Jr. and Richard E. Kuhn.
22 Oct 63, declassified 17 Jul 63. 26p
NACA RM L53I08a
OTS $2.60

N63-18042
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EXPERIMENTAL INVESTIGATION OF FLUTTER OF BUCKLED CURVED PANELS HAVING LONGITUDINAL STRINGERS AT TRANSONIC AND SUPERSONIC SPEEDS
W. J. Tuovila and Robert W. Hess. Jun 59, declassified 12 Jun 63. 21p
NASA MEMO 5-18-59L
OTS $2.60

N63-17464
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FIN LOADS AND TIP-CONTROL HINGE MOMENTS ON A 1/8-SCALE MODEL SIMULATING THE FIRST STAGE OF THE SCOUT RESEARCH VEHICLE AT A MACH NUMBER OF 2.01
Ross B. Robinson and Emma Jean Landrum, Apr 60, declassified 23 Apr 62. 19p
NASA TM X-239
OTS $1.60

N63-20530
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FREE-FLIGHT INVESTIGATION OF AERODYNAMIC HEAT TRANSFER TO A SIMULATED GLIDE-ROCKET SHAPE AT MACH NUMBERS UP TO 10
Andrew G. Swanson. 10 Sep 58, declassified 17 Jul 63. 50p
NACA RM L58G03
OTS $4.60

N63-14766
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FREE-FLIGHT TESTS TO A MACH NUMBER OF 1.5 OF SLENDER TRIANGULAR PYRAMID REENTRY CONFIGURATIONS
Joseph H. Judd and Gerard E. Woodbury. Mar 61, declassified 12 Mar 63. 27p
NASA TM X-437
OTS $2.60

N63-20537
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
HEAT-TRANSFER AND PRESSURE MEASUREMENTS OF A 1/7-SCALE MODEL OF A MERCURY CAPSULE AT ANGLES OF ATTACK FROM 0° TO PLUS OR MINUS 20° AT MACH NUMBERS OF 3.50 AND 4.44
Nancy L. Taylor, Ward F. Hodge, and Paige B. Burbank. Jun 61, declassified 17 Jul 63. 78p
NASA TM X-522
OTS $7.60

N63-20529
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
HEAT TRANSFER MEASURED IN FREE FLIGHT ON A SLIGHTLY BLUNTED 25° CONE-CYLINDER-FLARE CONFIGURATION AT MACH NUMBERS UP TO 9.89
Dorothy B. Lee, Charles B. Rumsey, and Aleck C. Bond. 26 Sep 58, declassified 17 Jul 63, 64p
NACA RM L58G21
ORS $6.60

N63-17991
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
HIGH-ALTITUDE PERFORMANCE OF A 64-FOOT-DIAMETER RING SAIL PARACHUTE
Max C. Kurbjun. Dec 59, declassified 12 Jun 63. 15p
NASA TM X-232
OTS $1.60

N63-17255
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
HYPERSONIC LONGITUDINAL TRIM, STABILITY, AND CONTROL CHARACTERISTICS OF A DELTA-WING CONFIGURATION AT HIGH ANGLES OF ATTACK
William H. Close, Apr 60, declassified. 49p
NASA TM X-240
OTS $4.60

N63-18041
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
INFLUENCE OF AUTOMATIC CONTROL OF ROLL COUPLING AND PITCH-UP ON TAIL LOADS
Ralph W. Stone, Jr. 17 Jun 57, declassified 12 Jun 63. 25p
NACA RM L57D18a
OTS $2.60

N63-20527
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN INVESTIGATION OF THE PERFORMANCE OF A SEMIELLIPTICAL SCOOP INLET AT MACH NUMBERS OF 1.60, 1.76, AND 2.02
Clyde Hayes and Ernest A. Mackley. 7 Jan 58, declassified 17 Jul 63. 66p
NACA RM L57G15
OTS $6.60

N63-12648
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LOCAL HEAT TRANSFER TO BLUNT NOSES AT HIGH SUPERSONIC SPEEDS
William E. Stoney, Jr. 12 Jul 57, declassified 1 Dec 62. 12p
Research memo. RM L57D25c
OTS $1.60

N63-20484
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LOW-SPEED INVESTIGATION OF THE EFFECTS OF HORIZONTAL-TAIL AREA AND WING SWEEP ON THE STATIC LONGITUDINAL STABILITY AND CONTROL CHARACTERISTICS OF AN AIRPLANE CONFIGURATION HAVING TAIL SURFACES OUTBOARD OF THE WING TIPS
William C. Hayes, Jr. and William C. Sleeman, Jr. Jun 59, declassified 17 Jul 63. 26p
NASA MEMO 6-11-59L
OTS $2.60

N63-17987
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
NACA CONFERENCE ON HELICOPTERS. A Compilation of the Papers presented May 12-13, 1954. [1954] declassified 12 Jun 63. 354p
OTS $21.00

N63-17994
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
PRESSURE DISTRIBUTION ON TWO MODELS OF A PROJECT MERCURY CAPSULE FOR A MACH NUMBER RANGE OF 1.60 to 6.01 AND AN ANGLE-OF ATTACK RANGE OF 0° TO 180°
Robert A. Newlander, Nancy L. Taylor, and E. Brian Pritchard Nov 60, declassified 12 Jun 63. 97p
NASA TM X-336
OTS $8.60

N63-14527
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
STABILITY CHARACTERISTICS FROM MACH NUMBER 1.0 TO 3.2 OF A MISSILE OF FINENESS RATIO 11.5 WITH A 10° FLARED-SKIRT AFTERBODY
Hal T. Baber, Jr. and Allen B. Henning. Mar 59, declassified 23 Apr 62. 36p
NASA MEMO 4-2-59L
OTS $3.60

N63-18038
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
STATIC LONGITUDINAL CHARACTERISTICS OF SEVERAL PROJECT MERCURY LAUNCH VEHICLES AT MACH NUMBERS BETWEEN 0.4 AND 6.8
James D. Church, Albin O. Pearson, and Peter J.Bernot Feb 61, declassified 12 Jun 63 49p 3 refs
NASA TM X-433
OTS $4.60

GPO NAS 1.12:127
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
TABLES OF AERODYNAMIC COEFFICIENTS OBTAINED FROM DEVELOPED NEWTONIAN EXPRESSIONS FOR COMPLETE AND PARTIAL CONIC AND SPHERIC BODIES AT COMBINED ANGLES OF ATTACK AND SIDESLIP WITH SOME COMPARISONS WITH HYPERSONIC EXPERIMENTAL DATA
William R. Wells and William O. Armstrong. 1962, 287p
Technical rept. R-127; N63-16425
GPO $2.25

DESCRIPTORS: *Bodies of revolution, Conical bodies, Spheres, Aerodynamic characteristics, *Hypersonic flow, Angle of attack, *Tables, *Atmosphere entry.

Newtonian closed-form expressions for the aerodynamic coefficients are developed for complete and partial conic and spheric bodies at combined angles of attack and sideslip. Calculations from these expressions are presented in tabulated form for various body shapes. Closed-form expressions for some of the static stability derivatives are also presented. Comparisons of this theory with hypersonic experimental data are made for many of the body shapes. (NASA abstract)

GPO NAS 1.12:139
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE THEORY OF INDUCED LIFT AND MINIMUM INDUCED DRAG OF NONPLANAR LIFTING SYSTEMS
Clarence D. Cone, Jr. 1962, 33p
Technical rept. R-139; N63-16288
GPO $0.40

DESCRIPTORS: *Airfoils, *Wings, Aerodynamic characteristics, Theory, Conformal mapping, Transformations (Mathematics), Analog systems.

The basic theory of the induced lift and drag of nonplanar, circulation lifting systems is investigated, and conformal transformation and electrical-analog techniques are developed for determining the minimum induced drag of arbitrary systems. Several complex systems are analyzed to illustrate the procedures. Problems attending the practical application of the results to airfoil design are discussed and possible solutions suggested. (NASA abstract)

N63-20526
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
TRANSONIC FLUTTER INVESTIGATION OF AN ALL-MOVABLE HORIZONTAL TAIL FOR A FIGHTER AIRPLANE
Norman S. Land and Frank T. Abbott, Jr. 14 Jan 57, declassified 17 Jul 63. 26p
NACA RM L56G06
OTS $2.60

N63-20539
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
WIND-TUNNEL INVESTIGATION AT MACH NUMBERS FROM 0.30 TO 1.14 OF THE STATIC AERODYNAMIC CHARACTERISTICS OF MODIFIED MERCURY ESCAPE AND EXIT CAPSULE CONFIGURATIONS
Albin O. Pearson, Jun 61, declassified 17 Jul 63. 36p
NASA TM X-547
OTS $3.60

N63-17992
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
WIND-TUNNEL INVESTIGATION OF STATIC AERODYNAMIC CHARACTERISTICS OF A 1/9-SCALE MODEL OF A POSSIBLE REENTRY CAPSULE AT MACH NUMBERS FROM 2.29 TO 4.65
David S. Shaw and Kenneth L. Turner, Dec 59, declassified 12 Jun 63. 20p
NASA TM X-233
OTS $1.60

NASA-MEMO-3-4-59E
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EFFECTS OF NOSE RADIUS AND EXTREME COOLING ON BOUNDARY-LAYER TRANSITION FOR THREE SMOOTH 15°-CONE-CYLINDERS IN FREE FLIGHT AT MACH NUMBERS TO 8.50
M. J. Krasnican and L. Rabb. Mar 59, declassified 12 Mar 63. 60p
N63-14756
OTS $1.50

N63-14759
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
EMPIRICAL COOLING CORRELATION FOR AN EXPERIMENTAL AFTERBURNER WITH AN ANNULAR COOLING PASSAGE
William K. Koffel and Harold R. Kaufman 26 Jun 52, declassified 12 Mar 63, 33p
NACA RM E52C13
OTS $3.60

N63-18045
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
PERFORMANCE OF AN ALL-INTERNAL CONICAL COMPRESSION INLET WITH ANNULAR THROAT BLEED AT MACH NUMBER 5.0
Leonard E. Stitt and Leonard J. Obery. 6 Aug 58, declassified 12 Jun 63. 19p
NACA RM E58E14
OTS $1.60

N63-13872
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
PERFORMANCE OF AN INLET HAVING A VARIABLE-ANGLE TWO-DIMENSIONAL COMPRESSION SURFACE AND A FIXED-GEOMETRY SUBSONIC DIFFUSER FOR APPLICATION TO REDUCED ENGINE ROTATIVE SPEEDS: MACH NUMBERS 0.66, 1.5, 1.7, and 2.0
John L. Allen, 30 Jan. 58, declassified 1 Apr 63, 32p
Research memo. RM E57J02
OTS $3.60

N63-20525
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
TOTAL-PRESSURE DISTORTION AND RECOVERY OF SUPERSONIC NOSE INLET WITH CONICAL CENTERBODY IN SUBSONIC ICING CONDITIONS
Thomas F. Gelder. 17 Sep 57, declassified 17 Jul 63. 41p
NACA RM E57G09
OTS $4.60

N63-20485
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
USE OF CONSTANT DIFFUSER MACH NUMBER AS A CONTROL PARAMETER FOR VARIABLE-GEOMETRY INLETS AT MACH NUMBERS OF 1.8 TO 2.0
Donald P. Hearth and Bernhard H. Anderson. 4 Nov 57, declassified 17 Jul 63. 26p
NACA RM E57G02
OTS $2.60

METALLURGY

TID-4005 (Pt. 1, 7th Ed.)
Atomic Energy Commission, Washington, D. C., Div. of Research.
SUMMARIES OF THE USAEC BASIC RESEARCH PROGRAMS IN METALLURGY, SOLID STATE PHYSICS AND CERAMICS
Jan 64, 366p
OTS $4.50

UCRL-11073
Lawrence Radiation Lab., Univ. of California, Berkeley.
DIFFUSION OF IRON INTO SINGLE-CRYSTAL MgO
Stuart L. Blank. Master's thesis. 15 Nov 63, 30p
Contract W7405-eng-48
OTS $0.75

N64-11381
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
CORROSION PROBLEMS ASSOCIATED WITH THE USE OF TITANIUM FASTENERS TO CONNECT ALUMINUM COMPONENTS
E. E. Nelson and J. G. Williamson. 30 Sep 63, 17p
MTP-P&VE-M-63-13; NASA TM X-51167
OTS $1.60

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

NYO-4700(Rev.)
Health and Safety Lab., Atomic Energy Commission, New York.
MANUAL OF STANDARD PROCEDURES. Mar 57, revised Aug 62. 416p
OTS $5.50

UCRL-11088
Lawrence Radiation Lab., Univ. of California, Berkeley.
NEUTRON SPECTRA FROM HEAVY-ION BOMBARDMENT OF GOLD
William G. Simon. Doctoral thesis. 21 Oct 63, 79p
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OTS $2.00

UCRL-11096
Lawrence Radiation Lab., Univ. of California, Berkeley.
A NUMERICAL STUDY OF THE REGGE PARAMETERS IN POTENTIAL SCATTERING
Akbar Ahmadzadeh. Thesis. 30 Oct 63, 155p
Contract W7405-eng-48
OTS $2.75

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Mannque Rho. Doctoral thesis. 21 Oct 63, 186p
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Lawrence Radiation Lab., Univ. of California, Berkeley.
THE STRUCTURE OF HEAVY NUCLEI: A STUDY OF VERY WEAK ALPHA BRANCHING
Charles Michael Lederer. Doctoral thesis. 27 Sep 63, 95p
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OTS $2.00

UCRL-10993
Lawrence Radiation Lab., Univ. of California, Berkeley.
STUDIES IN NUCLEAR SPECTROSCOPY BY TWO-NUCLEON TRANSFER REACTIONS
Richard H. Pehl. Doctoral thesis. 28 Aug 63, 162p
Contract W7405-eng-48
OTS $2.75

UCRL-10732
Lawrence Radiation Lab., Univ. of California, Berkeley.
A TECHNIQUE FOR MEASURING NEUTRON SPECTRA IN THE RANGE 2.5 TO 30 MeV USING THRESHOLD DETECTORS
John Clayton Ringle. Thesis. 11 Oct 63, 226p
Contract W7405-eng-48
OTS $3.00

LAMS-3025
Los Alamos Scientific Lab., N. Mex.
INTRODUCTION TO THE PROPOSED LOS ALAMOS MESON PROJECT
Louis Rosen and D. E. Nagle. Dec 63, 34p
Contract W7405-eng-36
OTS $0.75

PNE-229F
Naval Radiological Defense Lab., San Francisco, Calif.
SOME RADIOCHEMICAL AND PHYSICAL MEASUREMENTS OF DEBRIS FROM AN UNDERGROUND NUCLEAR DETONATION. Final rept. on Proj. SEDAN
W. B. Lane. Jun 63, 125p
OTS $2.50

RAI-329
Radiation Applications Inc., Long Island City, N. Y.
A STUDY OF THE MECHANISM OF RADIATION-INDUCED GELATION IN MONOMER-POLYMER MIXTURES. Rept. for period 1 May 61-31 Oct 63.
Bruce S. Bernstein and George Odian. 30 Nov 63, 98p
Contract AT(30-1)2816
OTS $2.25

Elementary Particles

BNL-787
Brookhaven National Lab., Upton, N. Y.
NEUTRINO PHYSICS. Brookhaven lecture series no. 23.
Leon M. Lederman. 9 Jan 63, 23p
Contract AT(30-2)GEN-16
T-300
OTS $0.50

SLAC-21
Stanford Linear Accelerator Center, Stanford Univ., Calif.
PION PHOTOPRODUCTION IN HYDROGEN AND BERYLLIUM
Martial Thiebaux. Nov 63, 46p
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OTS $1.25

Instruments and Installations

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Hanford Atomic Products Operation, Richland, Wash.
FIXED TIME ESTIMATION OF COUNTING RATES WITH BACKGROUND CORRECTIONS
W. L. Nicholson. Sep 63, 210p
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OTS $3.00

MURA-674
Midwestern Universities Research Association, Madison, Wis.
A METHOD OF RADIO-FREQUENCY INFLECTION INTO A PARTICLE ACCELERATOR
Donald Scott Roiseland. Doctoral thesis. 10 Jun 63, 225p
Contract AT(11-1)384
OTS $3.00

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Stanford Linear Accelerator Center, Stanford Univ., Calif.
A BENDING MAGNET WITH NONSATURATING SHIMMING
B. Hedin. Sep 63, 33p
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OTS $0.75

SLAC-20
Stanford Linear Accelerator Center, Stanford Univ., Calif.
EFFECTS OF STRAY MAGNETIC FIELDS AND RF COUPLER ASYMMETRY IN THE TWO-MILE ACCELERATOR WITH SECTOR FOCUSING
R. H. Helm. Oct 63, 24p
Contract AT(04-3)400
OTS $0.50

SLAC-25(Pt.1)
Stanford Linear Accelerator Center, Stanford Univ., Calif.
1963 SUMMER STUDY REPORT: PART I
K. Berkelman, G. R. Bishop, C. de Vries, G. Feldman, and D. B. Isabelle. 1963, 209p
Contract AT(04-3)476
OTS $3.00

SLAC-23
Stanford Linear Accelerator Center, Stanford Univ., Calif.
TWO-MILE ACCELERATOR PROJECT. Quarterly status rept. 1 Jul-30 Sep 63. Oct 63, 84p
Contract AT(04-3)400
OTS $2.00

Nuclear Engineering and Power

APAE-112(Vol. II)
Alco Products, Inc., Schenectady, N. Y.
30 MEGAWATT HEAT EXCHANGER AND STEAM GENERATOR FOR SODIUM COOLED REACTOR SYSTEM: VOLUME II. CHEMICAL AND STRESS ANALYSIS. 28 Feb 62, 278p
Contract AT(11-1)666
OTS $2.25

ANL-5719(Addendum)
Argonne National Lab., Ill.
EXPERIMENTAL BREEDER REACTOR-II (EBR-II). Addendum to Hazard summary rept.
L. J. Koch, W. B. Loewenstein, and H. O. Monson. Jun 62, 326p
Contract W31-109-eng-38
OTS $4.00

ANL-6695
Argonne National Lab., Ill.
TIME-OPTIMUM CONTROL OF NUCLEAR REACTORS WITH VELOCITY-LIMITED CONTROL DEVICES
Thomas P. Mulcahey. Doctoral thesis. Oct 63, 125p
Contract W31-109-eng-38
OTS $2.50

NAA-SR-9009
Atomics International, Canoga Park, Calif.
DEVELOPMENT OF TECHNIQUES FOR INPILE CAPSULE TRANSIENT HEATING EXPERIMENTS
C. F. Bumpus, Jr., M. Silberberg, R. N. Cordy, and W. N. Briggs. 30 Jan 64, 70p
Contract AT(11-1)GEN-8
OTS $1.75

NAA-SR-9010
Atomics International, Canoga Park, Calif.
INPILE EXPERIMENTAL STUDIES OF TRANSIENT BOILING WITH ORGANIC REACTOR COOLANT
P. Spiegler, J. Hopenfeld, M. Silberberg, and C. F. Bumpus, Jr. 30 Jan 64, 88p
Contract AT(11-1)GEN-8
OTS $2.00

WAPD-BT-29
Bettis Atomic Power Lab., Pittsburgh, Pa.
BETTIS TECHNICAL REVIEW: REACTOR TECHNOLOGY. Oct 63, 89p
Contract AT(11-1)GEN-14
OTS $2.00

WAPD-261
Bettis Atomic Power Lab., Pittsburgh, Pa.
IRRADIATION BEHAVIOR OF BULK B_4C AND B_4C + SiC BURNABLE POISON PLATES
R. G. Gray and L. R. Lynam. Oct 63, 120p
Contract AT(11-1)GEN-14
OTS $2.50

WAPD-MRP-106
Bettis Atomic Power Lab., Pittsburgh, Pa.
PRESSURIZED WATER REACTOR (PWR) PROJECT. Technical progress rept. 24 Aug-23 Oct 63.
Contract AT(11-1)GEN-14
OTS $2.50

BNL-815
Brookhaven National Lab., Upton, N. Y.
NONLINEAR KINETICS OF A TWO-TEMPERATURE REACTOR
Louis M. Shotkin. Aug 63, 16p
Contract AT(30-2)GEN-16
T-315
OTS $0.50

BNL-823
Brookhaven National Lab., Upton, N. Y.
NUCLEAR ENGINEERING DEPARTMENT. Progress rept. 1 May-31 Aug 63.
Jean H. Reynolds, ed. Dec 63, 108p
Contract AT(30-2)GEN-16
S-65
OTS $2.25

GEAP-3725
General Electric Co., San Jose, Calif.
SODIUM MASS TRANSFER: I TEST LOOP DESIGN.
R. W. Lockhart, G. Billuris, and M. R. Lane. Jun 62, 126p
Contract AT(04-3)189
OTS $3.00

HN-172(Vols. I&II)
Holmes and Narver, Inc., Berkeley, Calif.
A STUDY OF TEST REACTOR OPERATING AND SAFETY EXPERIENCE: VOLUMES I AND II.
B. J. Garrick, W. J. Costley, and W. C. Gekler. 10 May 63, 435p
Contract AT(04-3)424
OTS $5.00

ORNL-3529
Oak Ridge National Lab., Tenn.
MOLTEN-SALT REACTOR PROGRAM. Semiannual progress rept. for period ending 31 Jul 63. 1963, 155p
Contract W7405-eng-26
OTS $2.75

IDO-16907
Phillips Petroleum Co., Idaho Falls.
LOW COST ORGANIC MODERATOR-COOLANTS FOR NUCLEAR REACTORS
L. E. Gardner, W. M. Hutchinson, and J. C. Hillyer. 23 Dec 63, 30p
Contract AT(10-1)1080
OTS $0.75

Radioactivity

UCRL-11082
Lawrence Radiation Lab., Univ. of California, Berkeley.
ALPHA-DECAY STUDIES OF PROTACTINIUM ISOTOPES
Vishnu B. Subrahmanyam. Doctoral thesis. 22 Oct 63, 71p
Contract W7405-eng-48
OTS $1.75

UCRL-13010
Lawrence Radiation Lab., Univ. of California, Livermore.
RESEARCH ON RADIOACTIVE CONTAMINATION OF GROUND-WATER AQUIFERS. Interim rept. 15 Jun 61, 53p Prepared in cooperation with Texas Agricultural and Mechanical Coll.
Contract W7405-eng-48
OTS $1.25

PHYSICS

PB-165 083
Air Force Cambridge Research [Labs.] Bedford, Mass.
THEORY OF MOTION OF A THIN METALLIC CYLINDER CARRYING A HIGH CURRENT
Charles W. Dubs. Oct 56, 36p
Geophysical research papers no. 49; AFCRC-TR-56-208; AD-110 227
OTS $3.60

DESCRIPTORS: *Exploding wires, *Metal films, *Cylindrical bodies, Motion, Electric currents, *Nonlinear differential equations,

A simple-looking nonlinear differential equation of motion is found for a thin metallic cylinder carrying a high sinusoidal current. It shows the radius to be its initial value multiplied by a function depending only on two quantities, k and ωt, where t is the time and k is a parameter which depends on the initial radius and mass per unit length of the cylinder and on the amplitude and angular frequency ω of the current. The solutions obtained show the radius to decrease, gradually at first, then more and more rapidly until the cylinder collapses The time for the cylinder to collapse depends only on k and is equal to the current rise time for a unique value k_o of k. A simple expression found for the radius is exact for times near zero, becomes increasingly lower than the correct radius, and finally goes to zero at a time 1 or 2% less than the correct collapse time for k near k_o. An accurate method, also good for other current rise forms, is derived and applied for two values of k to give the radius as a function of time. The results lead to the collapse time equal to

$\frac{1}{2\omega}\left[\pi - 3.79\,(k - k_o)\right]$ for k near $k_o = 0.2596 \pm 0.0008$. (Author)

PB-165 082
Institute of Research, Lehigh Univ., Bethlehem, Pa.
MAGNETIC MATERIALS RESEARCH. Quarterly rept. no. 9, 16 Aug-15 Nov 60
George P. Conard, II and Edward J. Jablonowski. [1960] 11p
Contract DA36-039-sc-78092
AD-249 472
OTS $1.60

DESCRIPTORS: *Magnetic materials, Magnetic alloys, *Magnetostriction, *Metal films, Thin films, *Electrodeposition, Cobalt, *Cobalt alloys, *Iron alloys, Degradation.

The results of the studies of chemical decomposition techniques for production of thin cobalt and cobalt-iron films are evaluated. Consideration is being given to further studies of the electrodeposition technique of film production. The work on manganese base alloys and on high temperature magnetostriction is continuing. (Author) (See also PB 160 798-8)

UCRL-6473(Suppl. I)
Lawrence Radiation Lab., Univ. of California, Livermore.
ANNOTATED BIBLIOGRAPHY OF THEORIES OF THE EQUATION OF STATE OF HIGH TEMPERATURE GASES
Stephen G. Brush. 3 Jul 63, 97p
Contract W7405-eng-48
OTS $2.25

LAMS-3002
Los Alamos Scientific Lab., N. Mex.
OPACITY CALCULATIONS. Status rept.
Walter F. Huebner and Robert S. Stuart (Air Force Weapons Lab., Kirtland AFB) 1 Nov 63, 75p
Contract W7405-eng-36
OTS $1.75

N64-10107
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
A STUDY OF THE DISTRIBUTION OF MOLECULES UNDER FREE MOLECULAR FLOW CONDITIONS AFTER COLLISIONS WITH SIMPLE GEOMETRIES
David W. Tarbell and James O. Ballance. 28 May 63, 121p
MTS-AERO-63-43; NASA TM X-51032
OTS $10.10

ORNL-3525
Oak Ridge National Lab., Tenn.
TABLES OF FERMI INTEGRALS AND THE MULTIPOLE MOMENTS OF A ROUNDED CHARGE DISTRIBUTION
L. W. Owen and G. R. Satchler. 1963, 47p
Contract W7405-eng-26
OTS $1.25

Electronics

N64-12947
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ARC DISCHARGE IN A PARALLEL FLOW OF ARGON
Hiroshi Sato. 31 Oct 63, 23p
Contract NAS7-100
Technical rept. no. 32-520; NASA CR-50818
OTS $2.60

UCRL-10990
Lawrence Radiation Lab., Univ. of California, Berkeley.
A STUDY OF HYDROMAGNETIC WAVE PROPAGATION IN PLASMA
George R. Spillman. Thesis. 2 Oct 63, 95p
Contract W7405-eng-48
OTS $2.25

NASA-TN-D-2086
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
NONEQUILIBRIUM EXPANSION OF A PLASMA FROM A THERMIONIC SOURCE
Peter M. Sockol. Dec 63, 19p
N64-11791
OTS $0.50

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

IDO-10037 (Rev. 1)
Idaho Operations Office, Atomic Energy Commission, Idaho Falls.
MANUAL FOR OPERATIONAL DOCUMENTARY PHOTOGRAPHY (ODP)
V. V. Hendrix. 23 Dec 63, 23p
ORS $0.50

SOCIAL SCIENCES

GPO NS 1.11:39
National Science Foundation, Washington, D. C.
REVIEWS OF DATA ON RESEARCH AND DEVELOPMENT NUMBER 39. RESEARCH AND DEVELOPMENT IN THE AIRCRAFT AND MISSILE INDUSTRY (1956-1961). May 63, 11p
NSF 63-19
GPO $0.15

DESCRIPTORS: *Aircraft industry, *Guided missiles, Industrial production, *Industrial research, Costs, *Economics, Statistical date, *Engineering personnel, *Scientific personnel,

The bulletin presents statistics on funds for R&D performance in the aircraft and missiles industry for the years 1956 through 1961. Total R&D performance funds for all industries are also reported for these years. Other time series data for the years 1957-61 are presented for the sources of R&D performance funds, the dollar volume of basic research performance, R&D cost per R&D scientist or engineer, and R&D funds as percentage of net sales for the aircraft and missiles industry. The full-time-equivalent number of R&D scientists and engineers is shown for January 1957 through January 1962. (Author)

GPO PR. 35.8 Sci 2/Sci 2
President's Science Advisory Committee, Washington, D. C.
SCIENCE, GOVERNMENT, AND INFORMATION. THE RESPONSIBILITIES OF THE TECHNICAL COMMUNITY AND THE GOVERNMENT IN THE TRANSFER OF INFORMATION. 10 Jan 63, 54p
GPO $0.25

DESCRIPTORS: *Documentation, *Information retrieval, United States government, Sciences.

PB-165 122
Stifterverband für die Deutsche Wissenschaft, Essen-Bredeney (West Germany)
THE SCIENTIFIC AND ACADEMIC WORLD. 1959 yearbook
F. E. Nord and M. K. Malhotra, eds. 1962, 243p
Grant NSF-G18173
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Data are given concerning institutions of higher learning, government-sponsored and industrial research, learned societies, and financing of higher education and science in 25 nations. A section is included dealing with international aspects of science and scholarship.

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